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AMERICAN SHIP BUILDING CO.

Within the past couple of weeks marked advances have been noted in both the preferred and common stock of the American Ship Building Co. These advances are due mainly to the fact that after paying 7 per cent on the preferred stock since organization, and with practically no debt, the company will certainly show at the end of the present month, which concludes another fiscal year, a surplus of full $3,000,000, if not a sum quite largely in excess of that amount. There is also decided prospect of new ship building operations on a large scale for another year, notwithstanding the heavy tonnage output of the past two or three years. On the claim, therefore, that the surplus above referred to belongs largely to the common stock, holders of that stock look for some action favorable to their interests at the coming annual meeting. A reorganization of the finances of the company—some plan involving very probably a reduction in capital—is expected, more so than a dividend on the common stock.

The present advance in the common stock followed the listing of it on the Chicago exchange. Little attention had been given to the company in the money centers since its organization. It had been looked upon among the industrials as a rather close corporation. General attention was directed to it recently by a circular issued from the Chicago office of King, Hodenpyl & Co., well known bankers and brokers. The circular, which follows, is entirely reliable as to the company's affairs previous to the present year, and it is the general opinion that the estimate of earnings for this year is below rather than above the actual figure:

The preferred stock represents appraised value of the ship yards originally taken over by the company. A working capital was created by payment of $20 a share for the common stock. All of the property and interests of the company are free from mortgage or other incumbrances, excepting a $150,000 purchase mortgage on the Buffalo plant, which plant, consisting of two dry docks, construction shops, machine shop, etc., was acquired by purchase of earnings and without further issuance of capital stock. The capitalization, as shown by the last annual report, namely, June 30, 1901, was:

	Authorized.	Outstanding.
Preferred, 7 per cent., non-cumulative.....	$15,000,000	$7,900,000
Common	15,000,000	7,600,000

Regular dividends of 7 per cent. on the preferred stock have been paid in quarterly installments of 1¾ per cent. on the fifteenth days of January, April, July and October. The common stock is entitled to such dividends as may be declared out of net surplus earnings after 7 per cent. shall have been paid on the preferred stock. All of the plants, dry docks, shops and other property of the company have been kept in the best condition, the maintenance for this purpose having been charged to operating expense, and the plants and equipment are fully up to standard in every respect. Net earnings, as shown by annual reports, were as follows:

Fourteen months, ending June 30, 1900	$1,100,665.85		
Less dividends on preferred stock....	532,000.00		
Undivided profits or surplus.....	$ 568,665.85	Per cent. on common....	7.35
Year ending June 30, 1901.....	$1,998,542.46		
Less dividends on preferred stock	$553,000.00		
Less depreciation and maintenance	271,904.79	824,904.79	
Undivided profits for the year ending June 30, 1901	$1,173,637.67	Per cent on common.....	15.45
A conservative estimate for the current year would place the net earnings, after preferred dividends and depreciation at	$1,520,000.00	Per cent. on common.....	20.00
Making an estimated surplus June 30, 1902	$3,262,303.52	Per cent. on common.....	42.80
Adding to the surplus value of the common stock the amount originally paid thereon.....			20.00
Would make the surplus and investment value of said stock as of June 30, 1902.....			62.80

The earnings from repair work are greater in proportion than from new construction, and should be sufficient to pay the full 7 per cent. on the preferred and a dividend rate on the common stock, should the demand for new boats fall off. The company, however, has built a number of boats for salt water service and is contracting for more, showing its ability to compete with any of the construction plants on the coast. Financially the company is in the best of condition, being able to purchase for cash in the cheapest markets. The stocks are strongly held, and at present market appear cheap. We recommend the preferred as highest grade industrial, and common as a prospective dividend payer.

ADMIRAL DEWEY WILL COMMAND.

It is understood that at the urgent request of President Roosevelt and Secretary Moody Admiral Dewey has consented to take command of the big fleet which will engage in maneuvers in the West Indies next winter. The president and the secretary of the navy regarded it as appropriate that an officer of high rank should have charge of the fleet and they were gratified by the enthusiastic interest shown by Admiral Dewey when it was suggested to him that he go to sea again. The fleet will be the largest ever assembled by the United States in time of peace. It will consist of the North Atlantic squadron, the European squadron and the South Atlantic squadron, with a torpedo boat flotilla and necessary colliers, provision ships, a hospital ship, a repair ship, a distilling ship and water barges. There will be four divisions, commanded by Rear-Admirals F. J. Higginson, G. W. Sumner, A. S. Crowninshield and J. B. Coghlan. President Roosevelt is very anxious to attend these maneuvers and has said so to those with whom he has talked on the subject. If he can possibly witness them he will do so. He has had the matter of going under consideration, but the time when they will begin is so far away that he will postpone making his decision until just before the maneuvers are begun. Congress will be in session then, and this may prevent the president from leaving Washington. No president of the United States has ever been beyond its limits during his term of office, except on one occasion, when Grover Cleveland went some distance out to sea in a cruise on E. C. Benedict's yacht. The constitution does not forbid the president leaving the limits of the United States, but for reasons of sentiment or the feeling that they should not take any chances, none of the presidents has ever stepped foot on foreign soil while serving his term.

The maneuvers will take place in the vicinity of Culebra island, near Porto Rico, or Guantanamo, Cuba. The three squadrons are to meet at one of these places about Jan. 1, 1903. Should President Roosevelt go he must necessarily be absent from Washington for at least three weeks, and this would give him only a week with the ships. So long an absence from the United States would probably necessitate the designation of an acting president, and Secretary Hay, being next in the line of succession, would have this unique honor. The cruiser Mayflower, formerly the yacht of Ogden Goelet, is being fitted at the Brooklyn navy yard for the president's use, and she would carry him and the members of his party to the West Indies. It has been practically decided by Secretary Moody that he will witness the West Indian maneuvers, and he has invited Chairman Cannon of the house committee on appropriations, Chairman Hale of the senate committee on naval affairs and Chairman Foss of the house committee on naval affairs to go with him. Other members of congress will be invited. The object in inviting senators and representatives is to let them see for themselves the state of efficiency of the navy in its preparation for war. Admiral Dewey has not selected his flagship, but it will probably be the cruiser Olympia, in which he led the way into Manila bay on May 1, 1898. The Olympia was the flagship of Rear-Admiral Higginson up to June 9, when he transferred his flag temporarily to the battleship Kearsarge. The only two other officers who served as admirals of the navy, Farragut and Porter, never went to sea after they had been detached from war service.

ARCTIC STEAMER WINDWARD.

The Arctic exploring steamer Windward, now in New York undergoing repairs, was built at Sunderland, England, in 1865, and for more than a quarter of a century was employed in the Dundee and Peterhead whale fisheries. In 1894 she was purchased by Alfred C. Harmsworth, proprietor of the London Daily Mail, and took the Jackson-Harmsworth expedition to Franz Josef Land, being imprisoned in the ice there for the winter. For three seasons she carried supplies from London to Elmwood, the return trip in 1894 being memorable by the fact that Dr. Frithof Nansen and Lieut. Johansen, his comrade, were passengers. Upon Mr. Peary's visit to England in 1898, Mr. Harmsworth presented the Windward to him, and she sailed for this country, arriving here about the middle of June. The Windward, commanded by Capt. John Bartlett, sailed for the north July 3, 1898, and spent the following winter fast in the ice at Allman bay. She got clear of the ice early in August, 1899, and joining the auxiliary ship Diana at Etah, returned to Brigus, New Foundland. Repairs were made to the hull and machinery in the spring of 1900, and on July 20, commanded by Capt. Samuel W. Bartlett, the Windward sailed from Sydney, with Mrs. Peary and Marie Peary on board. Nothing further was heard from her, with the exception of a report from Godhavn, until the arrival of the auxiliary ship Erik at Etah in August, 1901. The Windward had spent the eight months from September to July fast in the ice of Payer harbor, near Cape Sabine. As soon as she extricated herself she spent a month in walrus hunting, and returned at the end of the season to New Foundland, practically under sail, as the utmost she could do with her engines under favorable circumstances was 3 knots an hour.

The Windward wintered at Brigus, N. F., and came to New York at the end of March this year, in order to have new machinery installed, and new accommodations built for Mrs. Peary and possibly some friends. This work is being done under the supervision of J. W. Millard, marine architect, and as soon as these alterations and changes are completed will start again for the north. The ship will be commanded on her next northward journey by Capt. Samuel Bartlett, who has been identified with her and with the Arctic work for the past three years. She will then fly, for the first time, the stars and stripes under an American registry granted by special act of congress and approved by President McKinley. She will also fly the pennant of the Peary Arctic Club, designed by Marie Ahnighite Peary, the daughter of the explorer, and the most northern-born white child in the world. Mr. Peary is now making his last dash northward, and it is the confident expectation of the members of the Peary Arctic Club, and of the captain, that Melville bay will be crossed in good time and that early in August a junction will be effected with Peary returning from the pole.

Negotiations involving some very large orders for new ships are under way with the American Ship Building Co. It is, in fact, claimed that although the information is withheld, the company has an order from Mr. A. B. Wolvin and his associates in the St. Lawrence river-Quebec transportation project for four steel steamers of the ten which it is proposed to build for the St. Lawrence trade. The vessels are to be of Welland canal dimension. A Cleveland vessel owner is working on the finances of another order that will involve, if it goes through, an expenditure of about $2,000,000 for new freighters.

BETHLEHEM STEEL AND SHIP BUILDING COMBINATION.

Negotiations have been completed by which the United States Ship Building Co.—the new ship yard combination outlined in the last issue of the Review—purchases the Bethlehem Steel Co. The control of the last named company has rested since last year with the firm of J. P. Morgan & Co., under an agreement with Charles M. Schwab, president of the United States Steel Corporation, made with that firm. About a year ago Mr. Schwab secured control of the steel company, much to the surprise of several financial interests which were at that time arranging a combination to include Bethlehem, Cramps and Vickers, Sons & Maxim. Mr. Morgan was abroad at the time but when he returned he inquired into Mr. Schwab's purchase and insisted that J. P. Morgan & Co. be permitted to control it. Friendly relations will exist between the new ship combination and the United States Steel Corporation. As a result, it is understood that there will be a readjustment of the United States Ship Building Co., including additions to the board of directors and an increase in the capitalization.

The plans for the ship building company have contemplated an authorized capital stock of $20,000,000 and $16,000,000 of 5 per cent. first-mortgage bonds. Of these bonds $9,000,000 are now being offered for public subscription at 97½ by the Trust Company of the Republic and Harris, Gates & Co. The company is to unite the following ship building concerns: Union Iron Works, San Francisco, Cal.; Bath Iron Works, Limited, and Hyde Windlass Co., Bath, Me.; Crescent Ship Yard and Samuel L. Moore & Sons' Co., Elizabethport, N. J.; Eastern Ship Building Co., New London, Conn.; Harlan & Hollingsworth Co., Wilmington, Del.; Canda Manufacturing Co., Carteret, N. J. The directors, it has been announced, will include Henry T. Scott, John S. Hyde, E. W. Hyde, Lewis Nixon, Charles R. Hanscom, Irving M. Scott, Charles J. Canda, Horace W. Gause, Daniel LeRoy Dresser and J. J. McCook.

The Bethlehem Steel Co. was incorporated in Pennsylvania on April 17, 1899. Its capital stock amounts to $15,000,000, divided into shares of $50 each. Mr. Schwab paid $24 a share for most of the company's stock, which he acquired in September, 1901.

Daniel Le Roy Dresser, president of the Trust Company of the Republic, has made this formal statement regarding the deal:

"The Trust Company of the Republic has completed negotiations whereby the United States Ship Building Co. has purchased the Bethlehem Steel Co. This plant will be put in with the others that have been consolidated, and whose bonds will now be offered to the public. With this acqvisition, the United States Ship Building Co. will be by far the most completely equipped and self-contained ship building plant in the world, manufacturing everything itself, including its armor plate and guns. From the financial aspect, this acquisition makes the securieties of the ship building combination very desirable. Either the combined plants, or the Bethlehem works itself, are making earnings more than sufficient to pay the interest on the bonds issued, so that the earnings from either plant can be applicable to the dividends on the preferred and common stock. This is, on the present basis of earnings, enough without figuring on any savings that may come due to the consolidations. This combination with the enormous facilities behind it, its strong financial backing, and with the management it will have, is destined again to put this country in the position which she once held as the leading ship building nation in the world."

Lewis Nixon, president of the Crescent Ship Yard, said:

"The acquisition of the Bethlehem Steel Co. by the United States Ship Building Co. is the most important industrial step taken in this country since the formulation of the United States Steel Corporation. It gives to the new company facilities for building a battleship complete with armament, armor and all equipment. No such company exists elsewhere in the world. Arrangements have been made with the United States Steel Comporation by which prompt deliveries of hull steel on favorable terms will enable us to promise vessels absolutely on time. More important, however, is the fact that in case of bidding for vessels in competition with European builders our hull steel will be obtained at a price that will not cause us to lose contracts on account of the price of steel. The Bethlehem Steel Co. is now making armor and forgings and building guns and gun carriages for the United States, Europe and Mexico, and work is in sight that will tax the capacities of Bethlehem and the ship yards far beyond that made by their present volume of orders. This company can now enter with confidence the foreign field and demand and obtain its share of the world's ship building, despite the adverse conditions which have heretofore confronted the American ship builder. The ship yards not in our consolidation will reap the benefits due to the healthy competition, as our desire is to put ourselves in shape to compete for foreign work, and in doing this we shall be doing the greatest service to the American ship owner and doing our part in bringing back the American flag in the foreign trade. We can develop ship building mechanics that will, in time, undoubtedly repeat the lessons of other industries having a steady demand for their products, and so give stability in employment and greater earning power to the workers. Whatever brings about a healthy and enduring ship building industry here will benefit every calling, profession and trade, and every American should be proud to see the establishment of a company upon a financial scale and technical basis that insure success."

Mr. Nixon added that the newly acquired property would be paid for by an issue of bonds in addition to the $9,000,000 issue, which is now offered to the public. He was not prepared to say how much the capital stock of the ship building company would be increased. The bonds now offered are secured by a first mortgage on the six plants in the new combination, which are appraised at more than $20,000,000. Above this appraised value the concerns will have a working capital of $5,000,000. The company has, according to the statement of its officers, contracts for work amounting to more than $36,000,000, on which they estimate the profits to be more than $5,000,000.

At a meeting held in Montreal last week the lease of the output of the mines of the Dominion Coal Co. was ratified by the shareholders of the Dominion Iron & Steel Co. The coal company thereby virtually passes to the steel company. Mr. James Ross was made president of both companies in succession to H. M. Whitney of Boston. Senator George A. Cox of Toronto and Senator Forget of Montreal were elected vice-presidents of both companies.

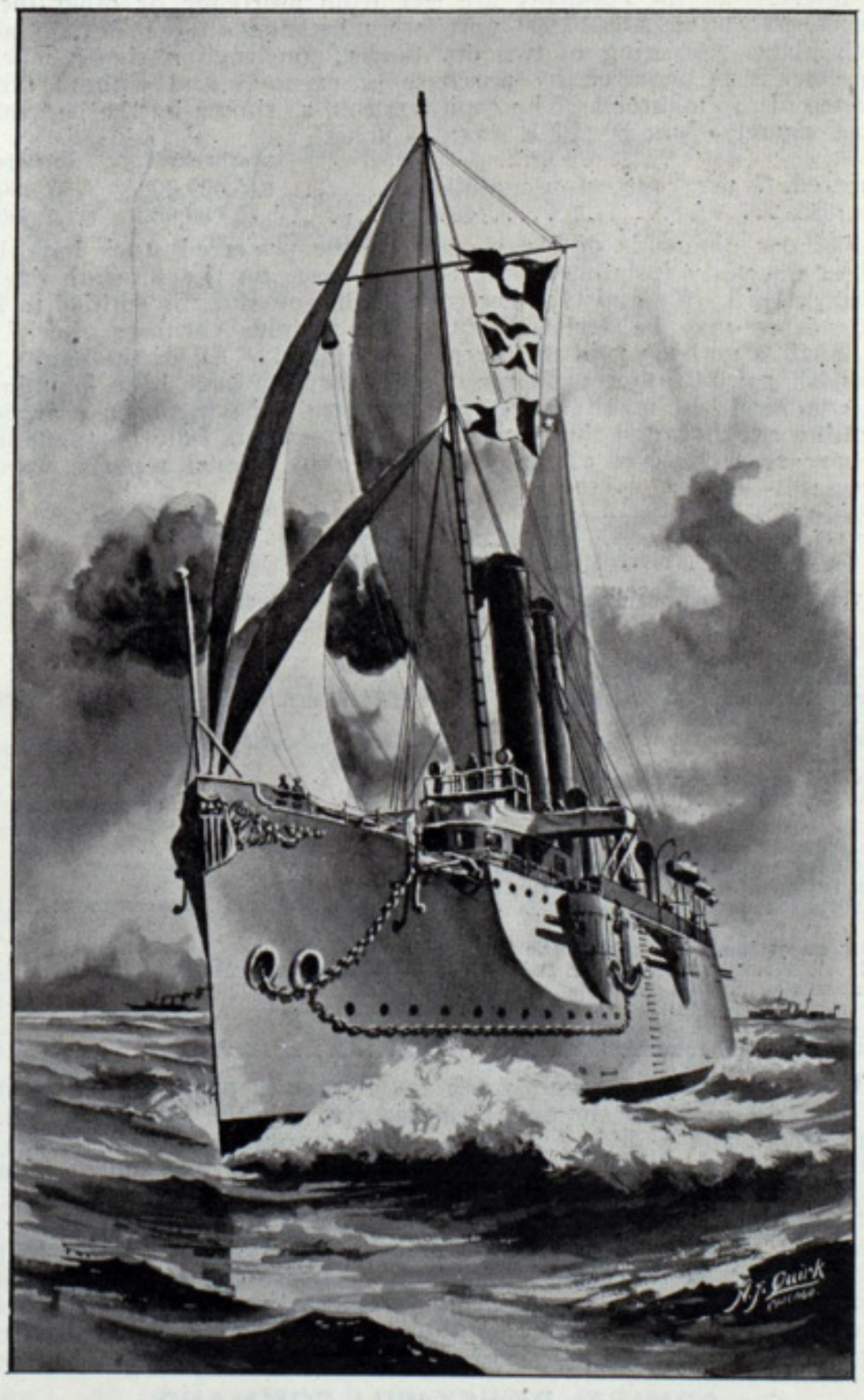
ROACH'S SHIP YARD PURCHASED AND REORGANIZED.

The Delaware River Ship & Engine Building Co., Chester, Pa., has been organized with a capital stock of $5,000,000, all common, and a bond issue of $2,500,000, bearing interest at 5 per centum. Papers of incorporation were filed at Trenton, N. J., last Saturday. The incorporators of the company are Osborn Congelton, George H. Cook and Henry F. West. Osborn Congelton is president of the American Elevated Railway Co. Concerning the new corporation, Mr. Congelton said:

"A syndicate composed of myself and others has bought out the Roach ship yard at Chester. We propose to double the capacity of the plant, and install all kinds of machinery that will enable us to build all kinds of vessels, including warships. Within twelve months we will be able to turn out one vessel a month. The company has been organized with the election of John B. Roach president; Osborn Congelton, vice-president; E. L. Levy of the ship building firm of Neafie & Levy, secretary; and D. E. Ford, marine engineer of the Standard Oil Co., general manager and treasurer. Within the next few years Chester will be the home of one of the largest ship building concerns in the world. The stock of the Roach company has been held by the Roach family for years. We have purchased practically all of their stock. None of the new stock will be offered to the public. With the proceeds from the stock we propose to carry out our plans of extensions and improvements. We have been guaranteed orders from sources which means steady work for our company for five years. The company has no connection with the proposed ship building trust. We took over the Roach company clear of all encumbrances."

LAUNCH OF THE CRUISER DENVER.

The cruiser Denver, one of a class of six, will be launched at the Neafie & Levy Ship & Engine Building Co.'s works, Philadelphia, on Saturday of this week. She will be christened by Miss Roberta M. Wright, daughter of Mayor Wright of Denver. The general dimensions and features of the Denver are: Length on load water line, 292 ft.; length, extreme, 308 ft. 2 in.; breadth, extreme, 43 ft.; mean draught at trial displacement, 15 ft. 3 in.; extreme draught, fully loaded, 16 ft. 8 in.



DRAWN BY NICHOLAS J. QUIRK.

THE CRUISER DENVER.

Her engines are of the vertical, inverted, four-cylinder, triple-expansion type with an estimated horse power of 4,500. Steam will be supplied by six water-tube boilers. Her main battery will consist of ten 5-in. rapid-fire guns. Her secondary battery will consist of eight 6-pounders, two 1-pounders and four Colt machine guns. She will have a sail area of about 6,000 sq. ft. Her complement of officers will be twenty-seven, seamen 238 and marines twenty-five.

The New England Co., Bath, Me., is building for the Baltimore & Boston Barge Co. a barge 225 ft. long, 35 ft. beam and 18 ft. depth of hold.

EASTERN SHIP BUILDING CO.'S WORKS.

The New York Tribune lately published a description of the works of the Eastern Ship Building Co., at New London, Conn., and illustrated it with half tones which were secured through the courtesy of Doubleday, Page & Co., of New York. While the scope of this yard and its operations since it was established a short time ago are well known to readers of the Review, still they may be interested in reading a spirited, non-technical newspaper account of it. The article is as follows:

Only in America would they undertake the building of the most capacious ships in the world in a yard that had to be built simultaneously with the ships. Only an American financier would trust a $5,000,000 contract to an untried, newly organized company without a sign of plant, and with no reputation except that which its president had won in other fields. But in America nearly everything is possible. It is on the bowlder-clad bank of the Connecticut Thames, in the little village of Groton, across from New London, that the tremendous undertaking is being worked out with an energy and dispatch that is surprising. In less than a year the work has proceeded so rapidly that the launching of the steamers will be possible in a few more months. James J. Hill, president of the Great Northern Railroad Co., gave the big contract which will soon add two 21,000-ton ships—the largest freight and passenger steamers the world has ever known—to the rapidly increasing fleet of American bottoms. Charles R. Hanscom, a native Maine ship builder, is the man whom Mr. Hill selected to form the Eastern Ship Building Co., which has the contracts. These floating monsters are the first of an American fleet which will mark a new era in the commerce of the Pacific. After steaming around Cape Horn they will run between Seattle and ports in Japan, China and Siberia. If present plans are carried out, there will be a procession of big steamers from the Groton and other yards to the new trade center on Puget Sound. From twenty to twenty-five vessels as large as those now building are contemplated. Each of these will be capable of carrying 2,500 carloads of freight, and as three ships will sail each week it means a weekly exportation of 100,000 tons of things which the United States produces and the Orient needs. The trade between northwestern ports and the Orient is in its infancy, but it is growing as no commercial child ever grew before. The Great Northern has a temporary connection with the Nippon Yusen Kaisha, a line of vessels which fly the Japanese flag. It is unsatisfactory because the ships are small and the number limited. The Northern Pacific sails a number of British ships from Tacoma, and the Canadian Pacific has three fast liners running from Vancouver, British Columbia, but ships which fly the stars and stripes are unknown in this particular trade, and probably will be until the new fleet is in commission.

A few years ago President Hill sent his 230-ft. steam yacht, the Wacouta, to the yards of the Bath Iron Works, at Bath, Me. Extensive alterations were to be made, and he went there in person to direct the work. He met Charles R. Hanscom, superintendent of the works, who had built the Wacouta, first called the Eleanor, in 1894. He became interested in the serious man of action and in his work. Even then Mr. Hill was working out plans for the great Pacific fleet, and had begun to look about for a yard in which to build them. Most of the old companies were crowded with work, and had contracts for years in advance. What was to prevent the creation of a yard in which the ships might be built? He asked himself the question, and sent for the Maine ship builder to answer it. In two weeks Mr. Hanscom was looking for a site for a new ship yard, and after one trip down the coast he had settled on the old Stonington railroad yard across from New London. That was a most active place when the passenger and freight trains on the New York, New Haven & Hartford Railroad were ferried across the Thames, but it had long since been practically abandoned. The river flowed with great depth up to the shore, and there was sufficient ground for the construction of a dozen ships at a time, with room in plenty for the steel yard and necessary buildings. The site was bare of buildings, except for an old brick roundhouse, which the railroad company left behind. This was turned into a "smithery." A small army of carpenters set to work on the other buildings, and in temporary quarters the draughtsmen began to work out the plans for the first two ships. Orders for the machinery equipment of the yard were marked "rush" in every case, and by the time the buildings were completed the great machines for the manipulation of steel were on the ground. In the meantime, contracts for material and supplies in unheard of quantities had been let, and within six months from the time the yard was projected the work on the two big steamers was under way. Twin ways were built on the sloping shore at the upper end of the yard, and upon them two monster keels were laid. Then came the shaping of the tank bottoms, from which the frames were built up. Then came the covering of the frame with its "skin" of steel plates and the laying down of decks, of which there are five in each vessel. The work was advanced rapidly in spite of the difficulty of securing skilled workmen and necessary steel material. Steamer No. 1, the name of which is still under consideration, will slip into the water in the fall, and No. 2 early in 1903.

A tour of the ship yard begins with the draughting room, where twenty-five young men are working over long rolls of blue print and tracing paper. Adjoining it is the moulding loft, 70 by 250 ft., said to be the largest in the country. A model of the steamers has a place of honor at one end of the room. It shows every plate of the outer hull, and even the thousands of rivet holes are marked. The exact lines are traced out on the model, and each plate is numbered. On the broad floor of the loft men are busy laying out the moulds for the different plates, in thin wood. In the joiners' room on the floor below men are already fashioning the cabin furnishings in mahogany, oak and cherry, and near them are many young pattern makers turning out wooden patterns for the castings which will be used in the vessels.

The steel yards of the works cover a number of acres. There are bars and plates of various widths, lengths and sizes. The plates are marked off in the yards for the alterations which must be made in the plate shop, and two traveling cranes do the heavy lifting. They can pick up five or ten tons of steel as easily as a man shoulders a basket of shavings. The machinery in the plate shop is most modern—that is one advantage of building up ship yards as you go. Between enormous steel rollers the plates are bent to the desired angle according to their position in the ship. It can handle plates up to 4,500 lbs. in weight. All of the rivet holes, and sometimes there are dozens of them in a single plate, are drilled or punched by ponderous machines which are scattered about the plate shop. Plates above an inch in thickness are drilled, the others punched. The yard is equipped with a roomy bending floor, on which all of the angle beams for the big steamers have been shaped. The process is an interesting one. The floor is of steel squares with perforations every few inches, making it look like a collection of checkerboards. In these holes dogs or grips can be inserted at will. Where the floor ends there is a long, pipelike furnace in which the bars are heated. When a bar has reached the proper glow it is hauled from the furnace to the bending floor and firmly clamped in place with a number of steel dogs or grips. Then a mould of the desired angle is put in position and the red hot bar hammered into shape around it by muscular young men who handle 70-lb. sledges as though they were tack hammers.

The hull of a steel ship in course of construction is as noisy as the proverbial boiler shop. It is entirely surrounded by scaffolding, among the timbers of which, here and there, can be seen busy workmen, clinging close to her steel sides and handling their compressed air instruments with precision and skill. They are the riveters who fasten the steel plates together with final firmness. On the stretch of deck, many feet above the ground, and overlooking the roofs of the highest buildings in the yard, other crews are at work doing the same thing. There are four men in a deck riveting crew, two who manage the riveting machine, which is mounted on wheels; another who runs the compressed air clipping machine, and a fourth who is beneath the deck, in charge of the "holder on." The red hot rivet is pushed through the holes already made in the plate shop and kept firmly in place by the "holder on"—a compressed air machine of great power. The riveting machine is wheeled into position, and a hidden hammer, with a noisy rap-rap-rap, each rap following the other in such quick succession as to make almost one sound, spreads it over the top of the plate. The clipping machine chisels off the surplus steel, and the rivet becomes a part of the deckplate. Two men, one above and one below deck, treat the smaller rivets in the same way. From 500 to 600 of the large rivets can be driven home in a day, and about 300 of the smaller ones. Even with this speedy method the task of riveting ships such as the Great Northern is building at Groton is a big one. More than 4,500,000 rivets are required in the two vessels.

And now for the most interesting feature of this remarkable yard—the "trolley system" of handling material on the monster steamers. Dr. Ernest von Halle of the University of Berlin and Naval Constructor Schwarz of the German imperial navy pronounced it "the nautical wonder of the new world" when they visited the works last year. It is something radically different from anything yet adapted to ship building. The general arrangement consists of three steel masts, which rise in the narrow space between the two sets of building stocks on which the big steamers rest. From a distance it gives them the appearance of being partially rigged. The masts are 120 ft. high, and each of them supports a steel crossyard, 174 ft. long, a length sufficient to cover the large beam of the steamers. This makes the trolley working field a rectangle approximately 600 ft. long and 174 ft. wide. The steel construction is held in position entirely by the wire rope guys, some of which run to the ground, where they are secured in granite anchorages. Two movable trolleys, each capable of carrying 5,000 lbs., are in operation on wire cable tracks. The operating machinery is installed in a house on the mainmast, which is placed just below the crossyard. In appearance it resembles the fighting top of a military mast. In this house are two hoisting machines, one covering the forward, the other the after portion of the two vessels. The machines are operated by a 35-H.P. continuous current motor, and the heaviest load can be hoisted up the staging runway in thirty seconds. The trolley which swings the heavy steel plates and machinery about the decks at the will of the engineer in the mast house is also capable of great speed. The overhead trolley system was designed by President Hanscom.

It is difficult to give a comparative idea of the size of these big steamers. Seen from the yards, they loom up to a dizzy height; a birds-eye view of the deck obtained from the power house on the mainmast between the building stocks reminds one of a city block. It is 630 ft. from the bow to the stern of each vessel. From the port to the starboard rail is 73 ft., and the depth is 56 ft. Vessels with greater length have been built before, but none with such generous dimensions all around. The gross tonnage is 21,000 tons, and the extreme load displacement is 38,000 tons. The steamers will be practically unsinkable, owing to the number and position of their water-tight compartments. They will have cellular or double bottoms, with 6 ft. between the inner and outer hulls. This space is divided into thirty-six water-tight compartments. A double keel, an innovation in ship building, runs the entire length of the steamers, on each side of which is a vertical keel. Owing to the weight of the steamers, special docking keels have been placed outside the hulls under the main girders, and keel blocks can be fitted without injuring the superstructure. The frames, the largest ever put into a vessel, are only 30 in. apart, and have 12-in. channels. They will have five regular decks—bottom, lower, 'tween, main and upper, and above that three deck erections amidships for first-class passengers, making really eight decks in all. The steamers will be provided with quarters for 1,500 passengers—150 first-class, 100 second, 170 third, 1,060 in the steerage. The main deck will be reserved for second-class and steerage passengers. The saloon will be on the upper deck, women's saloon, smoking room and library on the boatdeck. Novelties, for Pacific steamers at least, in the way of dispensary, barber's saloon and barroom, will be introduced. There will be a cold storage plant with a capacity for four weeks' supply of perishable ship's stores for 1,500 persons. There will be thirty-eight cargo winches for handling cargo.

The vessels will be driven with twin screws at a speed of 14 knots an hour. The engines, of 10,000 H.P., are nearly completed. The bunkers will carry 5,000 tons of coal, and are so arranged above the boilers that the fuel will be supplied to the fireroom by a gravity system.

The Baltimore Ship Building & Dry Dock Co., Baltimore, Md., is making extensive additions to its plant. A new machine shop, to measure 100 by 200 ft., is to be erected and to be thoroughly equipped with the latest machinery. All of the machinery will be operated by electricity.

SKETCH OF REAR-ADMIRAL GEORGE WALLACE MELVILLE.

We are told somewhere in Shakespeare that to paint the lily, to gild refined gold, to throw a perfume on the violet, to seek to add another hue unto the rainbow were wasteful and ridiculous excess; and it seems indeed to us utterly unnecessary and superfluous to say anything in these columns about Rear-Admiral George Wallace Melville, chief of the bureau of steam engineering. Probably no man in the world of marine engineering is better known. Surely everyone who reads the Review knows him or his work intimately. However it is pleasant when friends across the water point to his merits, and such publication becomes, in its way, a matter of news. The Review therefore takes pleasure in reproducing the following sketch from the Engineer of London:

"Rear-Admiral George W. Melville holds a unique position in the engineering world. He is the chief of the bureau of steam engineering of the United States navy. His office is at once more influential and more responsible than that of the chief engineer of any other navy in the world, and arrangements under which the naval work of the United States is done being such that more power is placed in the hands of the heads of departments than is usual elsewhere. Admiral Melville holds nearly all the honorary degrees that it is in the power of science to confer. He is a gold medallist by act of congress for heroic service in the Arctic regions. He is LL.D., M.Sc., Dr. Engineering, etc., and is a member of a large number of scientific societies, American and foreign. He is of Scotch extraction, the family coming from Stirling. He was born in New York on Jan. 10, 1841. When he left school he served an apprenticeship to Mr. James Binns of East Brooklyn. When the civil war broke out he joined heart and soul in the federal cause, and we find him when little more than twenty-one years old serving as an engineer officer in the inadequate navy of the northern states. He saw a good deal of service. He was stricken down by typhoid, and after a tedious convalescence he was appointed to the screw sloop Wachusett, mounting nine guns, and of about 1,000 tons displacement. In October, 1864, he became the leading actor in a drama of singular audacity. The Wachusett was lying in Bahia harbor, when the Confederate cruiser Florida, mounting two 7-in. rifles and six 6-in. guns, came in, and a Brazilian corvette was stationed between the two ships to keep the peace. The Florida had done much damage to American merchant shipping; she was, in a way, a second Alabama. Capt. Collins of the Wachusett challenged the Florida's captain, but he refused to fight, and Collins then determined to destroy the Florida. Melville suggested that she should be rammed where she lay. It was argued that if this were done the boilers of the Wachusett would break loose and scald to death the engine-room staff. Melville said that he did not think they would break loose, but that if they did only one man would be killed, himself, as he would remain below and order all hands on deck. At 2 a. m. on Oct. 7 the ramming took place. The Florida was captured and towed out to sea. The action lasted but twenty minutes, and there were only three men wounded, one of them being Melville. The act was grossly illegal. It was a violation of the rights of neutrals; but for this Melville was, of course, in no way responsible. He had but to obey orders.

"It is not necessary to trace Melville's career during the next few years. He was always on his way to the top. He became celebrated for his Arctic exploits, thanks to which his name is known all the world over. The story of his work has been very fully set forth by many writers in many publications. He first went north in the Tigress, in 1873, to rescue Capt. Hall of the Polaris, but the rescue had already been effected by a whaler. In 1879 he volunteered for service in the Jeannette. This vessel was wrecked in the ice in 1881, and after that Melville was the real leader in a journey of unexampled hardship. We quote here from Cassier's Magazine: 'Glance at the record of the engineer officer! In the beginning, the Jeannette avoided foundering only through his energy and skill; and she would have been abandoned long before she sank but for his inventive genius and resource. He was the first, through many dangers, to unfurl the flag on unknown Arctic land. He led the working force during the greater part of the fearful march to Bennett island. He commanded one of the three boats in the subsequent retreat; one of the two which reached the land, and was the only commander to bring his crew through safely. While yet enfeebled, he made a search, without parallel in Arctic history, for De Long, through wild storms and deadly cold and in the sunless day of the Arctic winter. In earliest spring-time, amid fierce gales, he found and buried his dead comrades. He recovered and brought back, while ill and partly frozen, all the records of the expedition. And, finally, before turning his face homeward, he made a last search for Chipp and his men, outlining with his party the entire coast of the Delta and entering the mouths of all its streams. Surely, the force of duty, of honor, and of friendship could no farther go than this.'

"Melville was promoted; and with the splendid part which he played in the relief of the unfortunate Greely expedition in 1884, his northern life ended. In 1887 he was appointed engineer-in-chief of the United States navy, and since that date he has done an enormous amount of work. During his tenure of office as engineer-in-chief of the navy, that is to say, from Aug. 9, 1887, to the present time, there have been constructed, or are now building, for the American fleet, 138 vessels of all types, with an aggregate horse power of 948,728, and a total displacement of 481,028 tons. The foregoing figures are true for today, with the exception of the latest projected ships, of which tentative plans have been prepared. The record of his work is indeed furnished by the United States navy itself. It will be understood that the appointment which he holds is like all other official appointments in the United States, from the president downward, for four years only. The fact that Admiral Melville has been reappointed three times is excellent testimony to his abilities and his value to the nation. He was given the rank of rear-admiral March 4, 1899. In the same year the admiral was given the degree of Doctor of Laws by Georgetown University, Washington, D. C., and that of Master of Science by Columbia University, New York city. He was also made an honorary member of the American Socity of Civil Engineers, and of the Franklin Institute of Philadelphia, and closed his term of office as president of the American Society of Mechanical Engineers. He was made Doctor of Science of the University of Pennsylvania July 22, 1901. During the war with Spain he held the engineering administrative reins. He believes in the gradual adoption of water-tube boilers. He supports the system of triple screws for naval vessels, and advocates as the best solution yet brought to his notice of the vexatious vibration problem, the Macalpine balanced engine. Finally, we may say that no man has worked harder to elevate the entire engineering profession—to improve the status and secure recognition of its members—and to this end he originated and secured from the United States congress an appropriation of $400,000 for a naval post graduate school and experimental station at Annapolis, Md. Admiral Melville has taken a keen interest in the improvement of the status of the engineers in the United States navy. Troubles almost identical with those in our own navy have arisen, the engineers and the executive or deck officers have not got on as amicably as is desirable; indeed, curiously enough, seeing how democratic is the United States, the executive has been less friendly to the engineers than our own officers are to our own engineers. Admiral Melville has endeavored to get over the difficulty by in a sense compelling every officer in the navy to become competent to stand watch in the engine room. We have already dwelt very fully with the scheme, and it certainly is not Admiral Melville's fault that it has not succeeded. Admiral Melville has at all times been perfectly willing to let his brother engineers know what he is doing. Congress authorizes the publication of reports, which are quite unique. These contain full information and drawings concerning the work in hand. Recently, it will be remembered, that through his courtesy we were enabled to publish drawings of the machinery of the newest warships in the United States navy and the specification to which it will be constructed. In this country the admiralty flatly refuse to permit the publication of drawings, and, in fact, decline to publish any information whatever, apparently because they fear outside criticism. Those who know him best, hold him to be a courteous gentleman and a warm friend. It would be difficult, we think, to overrate the importance of the part which he has played in the development of the United States navy."

SUMMARY OF NAVAL CONSTRUCTION.

An inspection of the monthly summary of naval construction will show that material progress is being made upon all the warships. A great many of them, especially the torpedo boats, are practically completed. Two submarines, the Adder and Mocassin, are virtually ready to be turned over to the government. Following is the summary:

Name.	Building at	Degree of completion, Per cent. May 1.	June 1.
BATTLESHIPS.			
Maine	Cramp & Sons	89	90
Missouri	Newport News Co.	63	65
Ohio	Union Iron Works	57	59
Virginia	Newport News Co.	1	1
Nebraska	Moran Bros. Co.	0	0
Georgia	Bath Iron Works	9	10
New Jersey	Fore River S. & E. Co.	8	9
Rhode Island	Fore River S. & E. Co.	7	8
ARMORED CRUISERS.			
Pennsylvania	Cramp & Sons	21	23
West Virginia	Newport News Co.	17	22
California	Union Iron Works	5	5
Colorado	Cramp & Sons	24	26
Maryland	Newport News Co.	16	20
South Dakota	Union Iron Works	4	5
SHEATHED PROTECTED CRUISERS.			
Denver	Neafie & Levy	79	80
Des Moines	Fore River S. & E. Co.	69	71
Chattanooga	Lewis Nixon	59	59
Galveston	Wm. R. Trigg Co.	58	60
Tacoma	Union Iron Works	44	47
Cleveland	Bath Iron Works	81	82
St. Louis	Neafie & Levy	3	3
Milwaukee	Union Iron Works	1	2
Charleston	Newport News Co.	3	5
MONITORS.			
Arkansas	Newport News Co.	95	96
Nevada	Bath Iron Works	93	93
Florida	Lewis Nixon	92	92
Wyoming	Union Iron Works	84	86
TORPEDO BOAT DESTROYERS.			
Bainbridge	Neafie & Levy	99	99
Barry	Neafie & Levy	99	99
Chauncey	Neafie & Levy	99	99
Dale	Wm. R. Trigg Co.	98	99
Hopkins	Harlan & Hollingsworth	89	93
Hull	Harlan & Hollingsworth	87	90
Lawrence	Fore River S. & E. Co.	99	99
MacDonough	Fore River S. & E. Co.	98	98
Paul Jones	Union Iron Works	90	92
Preble	Union Iron Works	93	97
Stewart	Gas E. & P. Co.	70	72
Truxton	Maryland Steel Co.	92	96
Whipple	Maryland Steel Co.	90	93
Worden	Maryland Steel Co.	89	91
TORPEDO BOATS.			
Stringham	Harlan & Hollingsworth	98	98
Goldsborough	Wolff & Zwicker	94	95
Blakely	Geo. Lawley & Son	98	98
DeLong	Geo. Lawley & Son	98	99
Nicholson	Lewis Nixon	98	98
O'Brien	Lewis Nixon	98	98
Tingey	Columbian Iron Works	74	74
Wilkes	Gas E. & P. Co.	98	99
SUBMARINE TORPEDO BOATS.			
Plunger	Lewis Nixon	92	93
Adder	Lewis Nixon	99	99
Grampus	Union Iron Works	70	81
Moccasin	Lewis Nixon	99	99
Pike	Union Iron Works	64	72
Porpoise	Lewis Nixon	97	97
Shark	Lewis Nixon	95	96

The president has signed the river and harbor bill. Some of the features are not especially to his liking, but they did not affect his approval of the measure as a whole. He is now most anxious to have congress enact an irrigation bill. The bill as passed involves a total of about $65,000,000 in direct appropriations and for work authorized.

At the works of the Laurie Engine Co., Montreal, there is under construction a dredge which will be utilized by the Golden Crown Mining Co. for the purpose of securing gold deposits lying at the bottom of the Stewart river, Yukon territory. The dredge is being built upon plans of A. W. Robertson and will have a capacity of 1,000 cubic yards per day.

BOND CONVERSION PLAN STOPPED.

Vice-Chancellor Emery has given an oral opinion making permanent the temporary injunction secured a week ago by Miriam Berger of Sullivan county, New York, restraining the United States Steel Corporation from retiring $200,000,000 of preferred stock and issuing $250,000,000 of bonds instead. In his opinion the vice-chancellor holds that the retirement of the preferred stock constitutes a preferential reduction of the corporation's capital among those assenting to the plan and a corresponding impairment of the right of those not assenting. The decision lays down the unequivocal rule that preferred stockholders are shareholders and have vested property rights which cannot be impaired by boards of directors without their consent.

It is contended that on behalf of the complainant, Mrs. Berger, that the proposed action of the United States Steel Corporation, by which $200,000,000 of the preferred cumulative 7 per cent. stock is to be retired by the issuing by the Steel Corporation of $200,000,000 of 5 per cent. bonds in lieu thereof, is illegal and unconstitutional in that it compels the complainant and all other preferred stockholders either to take 5 per cent. bonds in lieu of their stock, and thus lose 2 per cent. interest, or, if they do not consent, to have a prior lien of $200,000,000 placed ahead of their preferred stock without the corporation getting any new consideration therefor, or without any consideration passing to the stockholders who do not consent to the burden thus imposed upon them. It is further contended by counsel for Mrs. Berger that the Steel Corporation did not have power to retire preferred stock by the issuance of bonds in lieu thereof, prior to the act of 1902. It is contended that this act which, on the face of it, allows the steel company to make the proposed conversion, is unconstitutional and void as to the complainant and others who bought their stock prior to the passage of the act.

The Steel Corporation contended, on the other hand, that the act of 1902 was constitutional, and further that the proposed conversion was authorized by the contract among the stockholders themselves existing prior to the passage of the act.

Vice-Chancellor Emery holds that the Steel Corporation did not have the power to make the proposed conversion prior to the act of 1902, and that the rights of stockholders, which had vested prior to the passage of the act, could not be taken away by that act which was contrary to the provisions of the constitution of New Jersey.

Counsel for Mrs. Berger contended that the act of 1902, which was passed to allow the Steel Corporation to make the proposed conversion, was unconstitutional, on two grounds—that it took away the vested rights of stockholders and was special legislation. On account of the great importance of the case, the vice-chancellor has decided to continue the injunction, on condition that the complainant agree to argue the appeal, if one be taken, at the next session of the court of errors and appeals, which will be held the latter part of June.

Francis Lynde Stetson of counsel for the United States Steel Corporation said: "An appeal has been entered from the judgment of the court, ordering the permanent injunction. Beyond this, we cannot say just what course will be pursued."

It will be remembered that counsel for both sides last week, at the suggestion of the vice-chancellor, entered into a stipulation that the party against which decision should be rendered should file an appeal immediately thereafter, the object being to expedite the litigation and obtain at the earliest possible day a definite and final adjudication from the court of last resort upon the important question of the legality or illegality of the proposed conversion of preferred stock into bonds. At the office of J. P. Morgan & Co. no statement could be obtained beyond a reaffirmation of Mr. Stetson's announcement.

CARGO RECORDS OF LAKE FREIGHTERS.

The steamer Henry Steinbrenner loaded a large cargo of soft coal—6,696 net tons—at the Elsworth lake front dock, Cleveland, a few days ago, but it is not large enough to have place in the record list. The two largest coal cargoes as yet moved on the lakes—7,688 tons of anthracite and 7,388 tons of bituminous—are credited to the Steel Corporation steamer I. L. Elwood. The Steinbrenner was not fully loaded. She was going to Fort William where draught is limited, and with 273 tons of fuel in addition to cargo was drawing only 17 ft. 1 in. forward and 17 ft. 7 in. aft. She was loaded within twelve hours. Cargo records are as follows:

Iron ore—Steamer Wm. Edenborn, owned by Pittsburgh Steamship Co., A. B. Wolvin of Duluth, manager, 7,446 gross or 8,339 net tons, Two Harbors to Conneaut; tow barge John Smeaton, Pittsburgh Steamship Co., A. B. Wolvin of Duluth, manager, 7,446 gross or 8,339 net tons, Duluth to Cleveland, draught of 18 ft. 1 in.

Grain—Steamer Simon J. Murphy, Eddy Bros. of Bay City, 269,000 bushels of corn, equal to 7,532 net tons, South Chicago to Buffalo; steamer Douglas Houghton, Pittsburgh Steamship Co., A. B. Wolvin of Duluth, manager, 308,000 bushels of clipped oats and 60,000 bushels of corn, equal to 7,520 net tons, Manitowoc to Buffalo.

Coal—Steamer I. L. Elwood, owned by Pittsburgh Steamship Co., A. B. Wolvin of Duluth, manager, 7,688 net tons anthracite, Buffalo to Duluth; steamer I. L. Elwood, Pittsburgh Steamship Co., A. B. Wolvin of Duluth, manager, 7,388 net tons of bituminous, Cleveland to Duluth.

New works of the Philadelphia Pneumatic Tool Co., Twenty-first street and Allegheny avenue, Philadelphia, are being operated night and day. Attention is being attracted to the Keller pneumatic hammers, made by this company, by reason of a recently-devised improvement in their construction. It is claimed that on account of this improvement the working capacity of the chipping and riveting hammers is increased 25 per cent. and the vibration inseparable from any pneumatic tool is reduced materially. This applies to both chipping and riveting hammers. Recent large orders have been received from the Southern Pacific Co., Newport News Ship Building & Dry Dock Co., Pennsylvania Railroad Co., Lackawanna Steel Co., and others.

Quite an unusual privilege was accorded the two American naval officers, Capt. O'Neil and Comd'r Beehler, who attended the naval congress at Dusseldorf, in allowing them to visit and inspect the Krupp works at Essen. It has hitherto been the custom to rigidly exclude all foreign naval officers.

AROUND THE GREAT LAKES.

Capt. Frank Welcome, well known among vessel masters of the lakes, died in Buffalo a few days ago. The remains were taken to Port Huron for burial.

The recent accident in the United States canal at the Sault has served to remove doubts that existed as to the depth of water through the Canadian canal and its approaches. In the several days that the vessels used the Canadian canal exclusively, there was not an accident of any kind, and the steamer Curry passed down drawing 18 ft. 2 in.

Officials of the United States lighthouse board advertise elsewhere in this issue for bids for the construction of the twin-screw lighthouse tender Crocus, to be built for the tenth lighthouse district, which takes in Lakes Erie and Ontario. Bids will be opened July 10. Plans and specifications may be had from the lighthouse board, Washington. The plans are also to be seen at the office of the inspector of the tenth lighthouse district, Buffalo.

Corrigan, McKinney & Co. of Cleveland, dealers in iron ore and pig iron, have decided to close their Duluth office and transfer all work heretofore done in Duluth to Cleveland, where the main offices are located. Amos Shepard will hereafter be superintendent of the company's mines on the Mesabi range, with headquarters at Hibbing. George Wallace, superintendent of the Crystal Falls, Mich., district, has resigned to go into business for himself. His successor has not been appointed.

Representatives of Chicago vessel interests and city officials of Chicago have been holding conferences of late with a view to establishing rules for the navigation of the Chicago river. Attorney Chas. E. Kremer has been representing the vessel interests. The city seems anxious to get new and complete rules governing the river into effect, since there have been no end to accidents to bridges of late, which vesselmen say are due only in part to the fact that tug service has not been available to all craft during the tug strike. Among important revisions suggested by the vesselmen are rules providing large red lights on the bridges at night and the red ball now in vogue, for day use. In the latter instance arrangements will be made so that the bridge tender will be kept more closely to his duties, a point on which vesselmen have long been given reason to complain.

Capt. Michael Fitzgerald, who was in command of the steamer George G. Hadley, which sank the whaleback steamer Thomas Wilson off Duluth harbor a few days ago, with the loss of nine lives, has been deprived of his license by the local steamboat inspectors. Capt. M. C. Cameron, commander of the Wilson, had his license as a pilot suspended for sixty days. In the case of Capt. Fitzgerald, Inspectors Monaghan and Chalk inflicted the severest penalty under inspection laws. Capt Fitzgerald is an old navigator and had before the collision borne a splendid reputation. The inspectors found that no passing signals were exchanged between the Hadley and Wilson, although they were approaching each other nearly head on. The movement of the Hadley in starboarding her wheel when too near to avoid a collision was, the inspectors found, not authorized by any rule. The fault of the Wilson was in continuing at full speed after the Hadley had turned towards her. It was also found that no alarm signals were used by either ship.

FORESIGHT OF MR. J. PIERPONT MORGAN.

Mr. John W. Gates says that Mr. J. Pierpont Morgan is the greatest financier that the world has ever known. We are delighted to have Mr. Gates assume a position which we can unqualifiedly indorse. Mr. Gates adds that Mr. Morgan has in mind plans which are far vaster than any yet executed and that he proposes shortly to astonish the world. This, however, will be nothing new as Mr. Morgan has already astonished the world. The manner in which things are dovetailing into each other, as we shall presently show, is very interesting. The dovetailing is doubtless a deliberate operation and shows that Mr. Morgan is possessed of a very long head. As a promotor Mr. Morgan is absolutely alone. He does not seek money. Money seeks him. While not the richest man in the world by any manner of means he is by far the most powerful because he controls the money of the rich. This is the direct influence of character. Character is the greatest force in the world. It is greater than intellect and greater than wealth. It is commonly accepted that the Morgan properties are managed for the benefit of the shareholders—that is why money is forthcoming for any of his combinations in unlimited quantities. The biggest thing which Mr. Morgan has yet accomplished in the way of combination is the United States Steel Corporation. This great company seems to be the base of all his other industrial ventures. It is in the business of producing the raw material for tributary industries, and it is in those tributary industries which largely consume the output of the Steel Corporation that the Morgan money seems to be making a definite investment. The house of J. P. Morgan & Co. has just turned over to the United States Ship Building Co.—the new ship yard combination—the Bethlehem Steel Co., the control of which it has held for over a year. It is understood that whatever plates, angles and ship material the new ship yard combination may need over and above the capacity of its own plants to produce shall be secured from the United States Steel Corporation. Mr. Max Pam, counsel for the Steel Corporation, has been added to the board of directors of the ship yard combination. The first sale of United States ship building subscriptions has been made on the curb at 105.

The Raritan Dry Dock Co., Perth Amboy, N. J., recently launched the hull of a substantial wooden tugboat, built to the order of Theodore Smith's Sons Co. of Jersey City, N. J., for the United Fruit Co. of Boston. The tug is 75 ft. long, 17 ft. wide and 9 ft. deep. She is built of oak, sheathed with metal and copper-fastened throughout. The engine is a fore-and-aft compound, the diameter of the cylinders being 13 and 26 in. with 14 in. stroke of piston. She will have a Scotch boiler 9 ft. by 10½ ft. She will be named El Criado.

The Riter-Conley Mfg. Co. of Pittsburgh has recently decided to adopt alternating-current motors exclusively for power distribution. They have purchased three 200 K. W. engine-type Westinghouse generators which are to be direct-connected to Westinghouse gas engines using natural gas. Alternating currents will be used for all work, including cranes, and a number of Westinghouse type "F" induction motors will be geared directly to straightening rolls.

SCOTCH SHIP BUILDING LETTER.

Glasgow, Scotland.—More combines and rumors of combines! They are for the most part the invention of ill-informed newspaper paragraphists. But you may shortly expect to hear of a new deal in which the Cunard and Glasgow-owned concerns will have a prominent part. It is not the way of Scotch ship owners and traders to sit still and allow others to make all the running. The speculations resulting from the issue of the circular by Lord Inverclyde, the chairman, to the shareholders of the Cunard company (which has been cabled to your side) are wide of the mark. Meanwhile it is safe to say that there is not the slightest probability of either the Cunard, the Anchor, the Allan, or the Elder-Dempster lines being absorbed in the Morgan combine. But there are any number of companies open to sell their whole fleets, stock, lock and barrel, on the same terms as the White Star—or even less—and without even waiting for the report of the parliamentary committee, just reappointed, to inquire into the effects of foreign shipping subsidies on British trade and British shipping.

I should not be surprised if we witness another boom in ship building this year—partly as the result of the craze for combines, and partly as the result of the conclusion of peace in South Africa. The termination of the war will, of course, release—though not immediately—a considerable number of vessels chartered by the admiralty for the transport of troops, horses, and stores, outwards. But a large nnmber of vessels will be required for many months to come in bringing home the troops and in taking out fresh contingents for the garrison. More vessels also will be required to take the Boer prisoners home from Ceylon, India, Bermuda, St. Helena, etc. And of course there will be a rush to South Africa from all parts—of miners, squatters, prospective settlers and restless adventurers, whose needs will give employment to a large amount of tonnage. Then as settlement progresses there will be enormous demand for the carriage of railway and building material. The summer months are usually quiet in the ship building world, as far as the booking of new business is concerned, so that evidences of revival need not be looked for before August or so.

SHIP BUILDING OUTLOOK—SUMMARY OF OUTPUT.

Meanwhile our Scotch ship builders are not booking enough to fill up the gaps caused by the monthly launches. In May they launched forty vessels of 59,250 tons, and the new contracts booked would not exceed about 20,000 tons, and did not include anything of special importance beyond the Clan liners and the oil-tankers to which I referred in previous letters. The May output is the highest of any month this year, and it compares with 56,132 tons in May 1901, 53,580 tons in May 1900, and 58,920 tons in May 1899. It brings up the total for the five months to 211,900 tons, as compared with 199,720 tons in 1901, with 180,150 tons in 1900, and with 217,745 tons in 1899. The five months' total beats the record, except that of 1899. Of the May total, Clyde builders contributed thirty-three vessels and 57,270 tons, Forth builders 1,000 tons, Tay builders 570 tons, and Dee builders 400 tons. The Clyde proportion for the five months is 196,800 tons. Most of the principal vessels launched during the month were noted in my letters at the time. There were one of 9,000 tons, one between 7,000 and 8,000 tons, two between 5,000 and 6,000 tons, two between 4,000 and 5,000 tons, three between 3,000 and 4,000 tons, one between 2,000 and 3,000 tons, three between 1,000 and 2,000 tons, and the rest under 1,000 tons each. Fully three-fifths of the May tonnage was for London owners, and a fourth for other English and Scotch ports, while 4,560 tons were for Russia, 3,000 tons for Greece, 2,500 tons for Spain, 1,500 tons for Belgium, and 1,000 tons for other foreign owners. Most of the new tonnage was for established lines or special purposes.

Various projects are on foot for the development of trade relations between Great Britain and South Africa. Durban is the possessor of one of the best-equipped harbors in South Africa, but the port has long been hampered by the existence of a bar. The government of Natal have mitigated the difficulty by the use of powerful dredgers, and another vessel of this type has just been launched here, namely, the Grampus, a suction-pump dredger of 1,300 tons hopper capacity, which Messrs. Wm. Simons & Co., Ltd., Renfrew, have built to the order of the government of Natal. The Grampus is 218 ft. in length, 30 ft. 6 in. in molded breadth, and 16 ft. 7 in. in molded depth. The pumps are capable of raising 3,000 tons of sand per hour, working to a depth of 34 ft. under water level. The large main suction pipe is 44 in. in diameter, and is fitted with a central well at the fore end, where it is controlled by means of powerful hydraulic gear fitted on the upper deck. This pipe is connected to the pumps, and is fitted with a novel arrangement of flexible joints, which enables the vessel to plunge about on a 25-ft. radius without disturbing the nozzle on the ground. The propelling engines are two sets of the triple-expansion type of 1,450 I. H. P., driving twin-propellers at a speed of 10 knots. The port of Durban, thanks to the use of dredgers, has now 19 ft. 6 in. of water at low-water springs, and a depth of 23 ft. 6 in. at high-water springs. Vessels from 8,000 to 10,000 tons can now cross the bar, and the equipment of the harbor has advanced to pretty much the same ratio.

FINAL REPORT FROM BOILER COMMITTEE.

The committee appointed by the admiralty to consider the water-tube boiler question have concluded their investigations, and the final report is being prepared. I learn in advance that they again condemn the Belleville boiler, as they did in their first report, but they are far from advising an unconditional resort to the old cylindrical boilers. While differentiating between certain types of water-tube boilers, they refrain from plumping for any one design, when there has been so little of prolonged experience with any but the Belleville. We are likely, therefore, to continue to apply various types, as in the case of the armored cruisers now being laid down. In the decision to have a combination of cylindrical boilers, either with closed stokehold or heated draft, along with a large proportion of water-tube boilers, is the main conclusion of the committee, but they would prefer a larger proportion than one-fifth of the boiler power constructed on the cylindrical system. The ratio of two cylindrical to three of water-tube boilers in one of the battleships of the King Edward VII class is the idea of the majority of the committee, but with cruisers more than battleships the question of weight is an important factor. The committee will remark on the increasing responsibility of the naval engineer, and the need for greater assistance. Pending the report of this committee the admiralty have made certain explanations. The boiler difficulty is no new trouble to them, for long before water-tube boilers were heard of the navy had its difficulties with various forms of boilers, and with leaks in boilers and defects connected with the crown of the furnace. The cylindrical boiler was brought to a point approaching perfection, but a perfection with very distinct limitations. The type of ship in which that perfection might be said to exist was the Majestic, the Talbot, and the Gibraltar. The difficulties arose from the different conditions of the machinery for mercantile and naval purposes. In the case of the merchantman there is practically no limit to the space that could be devoted to the machinery or its weight; but not so with the man-of-war, where all space has to be carefully economized, and where every pound of weight saved in the machinery can be utililized in armament or armor. The difficulties in regard to leakage from expansion and contraction was overcome by the invention of an appliance called "the admiralty ferrule." But these ferrules became liable to what is called "bird-nesting"—that is to say, they are liable to be filled up by a hard substance drawn in with the hot air. In the case of the Minerva an extreme case of "bird-nesting" occurred, and if her coal had not given out when she got to Plymouth, she could not have gone any further, as her tubes were absolutely filled up. The cylindrical boiler reached a point of development when the admiralty had to consider whether they would pass to a new form of boiler, the water-tube. It was claimed that the water-tube boiler had great advantages over any other for naval purposes; that it was easier of access for repairs, and that much more horsepower could be got for the same amount of weight. After considering the question and after careful investigation the board of admiralty of the day did, as we know, decide to introduce the water-tube boiler. With the Belleville boiler they have had difficulties which apparently foreign navies have not had. The causes of these difficulties were inferiority of manufacture, improper management, higher pressure, and greater usage. There is no doubt that these boilers in the first instance were made by workmen who had no previous experience of their construction, and during the engineers' strike. As they required most careful management a great deal of the difficulties of the admiralty was due almost entirely to the mismanagement of them. Then with regard to the high pressure, while cylindrical boilers are worked at a pressure of 150 lbs. to the square inch, the pressure was raised to 300 lbs. in the case of the Belleville boiler—considerably higher than that at which they are worked in France. And our cruisers in which the difficulties occurred were racketted about more than the cruisers of any other nation. The committee appointed to inquire into the matter gave its verdict against the Belleville boiler with no uncertain voice, and the condemnation has been accepted by the admiralty, although some of the board still believe that if well constructed and well managed these boilers would fulfil naval conditions both in peace and in war. It will never, however, be an economical boiler as regards coal, and it will cost more in repairs than the cylindrical. What the admiralty have done has been to follow the advice of the boiler commission, both as to the manner and extent in which the Belleville boiler has been rejected, and also as to the use of a combination of water-tube and cylindrical boilers.

RAPID GROWTH OF PINTSCH LIGHT SYSTEM.

An interesting statement has been issued by the Safety Car Heating & Lighting Co. of New York, showing the remarkable increase in the use of the Pintsch light system during the past twelve months, as well as giving the total number of cars, locomotives, buoys and beacons equipped with this system throughout the world. Upon reference to the table it is found that there are at present in the United States and Canada 18,663 cars equipped with the Pintsch system of lighting, while in the territory controlled by the American company there are sixty-six Pintsch gas manufacturing plants in operation. The complete statement appears below:

STATEMENT OF CARS, LOCOMOTIVES, BUOYS, ETC., USING PINTSCH SYSTEM OF LIGHTING, MAY 1902.

	Cars.	Locomotives.	Gas Works.	Buoys and Beacons.
Germany	40,156	4,786	71	124
Denmark	45	...	3	21
England	18,859	18	87	272
France	6,741	...	27	240
Holland	3,487	5	10	86
Italy	1,528	...	5	15
Switzerland	380	2	1	...
Austria	4,218	...	10	1
Russia	3,041	112	13	13
Sweden	679	43	4	2
Servia	216	...	...	...
Bulgaria	98	...	1	...
Turkey	114	...	...	...
Egypt	42	...	3	118
Canada	166	...	3	65
Brazil	974	31	1	33
Argentine	1,096	...	10	2
Chili	46	...	2	...
India	9,584	...	16	...
Australia	2,053	...	13	38
United States	18,497	...	63	172
Japan	100	...	2	4
China	...	...	1	15
Mexico	81	...	1	...
Total	112,191	4,997	347	1,211
Increase for the year	6,527	525	11	49

John H. Dialogue & Sons, Camden, N. J., have just closed a contract with A. S. Hughes' Sons of Philadelphia for a tugboat of the following dimensions: Length, 100 ft.; beam 21 ft. and depth 12½ ft. The tug will be christened J. T. Lewis and will be a duplicate of the J. A. Hughes, now on the stocks at Dialogue's ship yard.

PRODUCTION OF IRON ORES.

THE LAKE SUPERIOR REGION PRODUCES 74 PER CENT. OF THE OUTPUT OF THE ENTIRE COUNTRY—MR. JOHN BIRKINBINE'S FIGURES.

Mr. John Birkinbine, who, through long years of association with the work, has unquestionably become the greatest authority in the country on iron ore production, has contributed to the mineral department of the United States Geological survey articles upon the production of iron ores in the United States during 1901. The production last year amounted to 28,887,479 long tons as compared with 27,553,161 long tons in 1900, a gain of 1,334,318 long tons or 5 per cent.; the gain of 1901 over 1898 was 9,453,763 tons, or 49 per cent., a phenomenal growth. The total value at the mines of the ore mined in 1901 was $49,256,245, or a mean value of $1.71 per ton, an apparent decrease of 71 cents, or 29 per cent. from the 1900 figures of $2.42 per ton. The value of the iron ore mined in 1900 was $66,590,504. The largest amounts of iron ore officially reported to date from any other countries are 18,667,950 long tons mined in Germany and the Luxembourg in 1900, and 18,031,957 long tons mined in Great Britain in 1882.

Twenty-five states and one territory mined iron ore in the year 1901, the number of producing states remaining the same as in 1900, Utah dropping out and South Carolina taking its place. As in the year 1900, Minnesota contributed the greater portion of the increase for 1901, and advanced to first place as a producer; Michigan, which has uninterruptedly occupied this position since the year 1881, now being second. New exploitations for standard ores in the Lake Superior district are being actively carried on, and in addition, some silicious and lower grade ores, of which large quantities exist, are liberally exploited. In the central west valuable deposits of iron ore in Wyoming, Colorado and New Mexico are being worked extensively to supply the Colorado furnaces. On the Pacific coast the Irondale furnace in Washington has resumed operations, but its principal reliance so far has been on the magnetite deposits of Texada island in British Columbia.

In 1901 the red hematite mines contributed 24,006,025 long tons, or 83.10 per cent. of the total for the United States, an increase of 6 per cent. over the 1900 total. Minnesota was the largest producer of this class of ore, followed by Michigan and Alabama. The total brown hematite mined was 3,016,715 long tons, or 10.44 per cent. of the output of the country, a decrease of 7 per cent. from the 1900 record. Virginia and West Virginia, combined, lead as a brown hematite producer, followed by Alabama and Tennessee. Of magnetic ores 1,813,076 long tons, or 6.28 per cent. of the United States total, were mined in the year 1901, an increase of 18 per cent. over the total for 1900. Pennsylvania was the principal contributor, followed by New Jersey and New York. Only 51,663 long tons of carbonate iron ore was mined in 1901, being 0.18 per cent of the total iron ore output for the year. Practically all of this came from Ohio, although Maryland, New York and Pennsylvania contributed small amounts.

In the thirteen years since the year 1889, when the United States geological survey began collecting the statistics of the amounts of the different classes of iron ore mined, the red hematites have contributed 180,551,009 long tons, or 76.85 per cent. of the total; the brown hematite mines, 30,945,504 long tons, or 13.17 per cent.; the magnetic deposits, 21,524,693 long tons, or 9.16 per cent.; and the carbonate ores, only 1,926,668 long tons, or 0.82 per cent. of the total.

The greater part of the iron ore in the United States continues to be supplied by the Lake Superior region, which produced its maximum output of 21,445,903 long tons in 1901, being 74 per cent. of the total quantity reported and an increase of 4 per cent. over the total for 1900. The Marquette range, in the state of Michigan, from which ore was first taken in 1856, has contributed, up to date, 62,847,473 long tons. Most of this ore is shipped from the ports of Marquette and Escanaba. The Menominee in the states of Michigan and Wisconsin, was the second range to be opened in 1877, and it has contributed to date 37,621,428 long tons, the greater portion being shipped from Escanaba and a small amount from Gladstone. The Gogebic range, in the states of Michigan and Wisconsin, and the Vermilion range in Minnesota began shipping in 1884, the Gogebic range having shipped to date 34,154,790 long tons from the ports of Ashland and Escanaba, and the Vermilion range having shipped to date 16,977,243 tons from the port of Two Harbors. The Mesabi range in Minnesota began shipping in the year 1894, and has shipped thus far a total of 40,404,967 long tons, and has now apparently greater resources of ore than any of the older ranges. In 1901 this range produced 9,303,541 tons, or 32 per cent. of the total for the United States. A sixth range was opened in Canada in the year 1900, the ore being shipped principally to the United States from the port of Michipicoten in the province of Ontario, and the total output to the close of 1901 amounting to 284,679 tons. From the above it appears that in the year 1901 the Mesabi range ranked first, producing its maximum output of 9,303,541 tons, a total that has never been reached by any other iron ore region in the world, the Bilboa district in Spain being its closest competitor.

Taking the states in the order of their production we find that Minnesota contributed 11,109,537 long tons, or 38 per cent. of the total for the United States, and is easily entitled to first place. In fact, with the exception of the German empire and Great Britain, no country in the world has reached so great a total in any year as the state of Minnesota in 1901, and this phenomenal product exceeded by 3,989,175 long tons the production of iron ore of all the mines combined, as reported by the tenth census of the United States in 1880. Michigan ranks next, with a total of 9,654,067 long tons of iron ore, a decrease of 3 per cent. from the total for 1900. Alabama ranks third, with a production in 1901 of 2,801,732 long tons with nearly 10 per cent. of the total. Pennsylvania regained fourth place, contributing 1,040,684 tons, an increase of 19 per cent. over the state total for 1900. Virginia and West Virginia combined ranked fifth, mining 925,394 tons, an increase of nearly 4 per cent. over their total for 1900. Tennessee increased her output 33 per cent. over the total of 1900, and ranked sixth with 789,494 tons. Wisconsin came seventh, with 738,868 tons. New York was eighth, with 420,218 tons, a decrease of 5 per cent. over the state total of 1900. Colorado ranked ninth, with a total of 404,037 tons, a decrease of nearly 1 per cent. from the state production of 1900. Some of the Colorado ores carry enough silver to make them valuable on that account, and therefore they are not included in this report. New Jersey came tenth, with 401,989 tons, an advance of 17 per cent. upon the 1900 output. Georgia and the two Carolinas together contributed 215,599 long tons of iron ore; and none of the remaining states, except Wyoming, produced over 100,000 tons of iron ore.

During 1901, 104 iron ore operations each produced over 50,000 tons of ore, and combined they produced over 25,000,000 tons, or 88.4 per cent. of the production of the country, as compared with 88.3 per cent. in 1900. Of these mining operations, thirty-seven are in Michigan, thirty in Minnesota, ten in Alabama, five in Tennessee, four in Wisconsin, three each in Colorado, New Jersey, New York and Virginia, two each in Georgia and Pennsylvania, and one each in New Mexico and Wyoming; and one contributed over 1,600,000 tons; two over 1,000,000 tons; and one between 1,000,000 and 900,000 tons; one between 900,000 and 800,000 tons; two between 800,000 and 700,000 tons; five between 700,000 and 600,000 tons; two between 600,000 and 500,000 tons, and ninety between 500,000 and 50,000 tons.

The highest average value reported in 1901 was $3.18 per ton in Colorado; the lowest average rate was in Alabama—92 cents per ton. The total stock of iron ore in the United States, reported as on hand at the mines on Dec. 31, 1901, was 4,239,823 long tons, an increase of 14 per cent. over the 1900 total, and of this total Minnesota, Michigan and Wisconsin carried 94 per cent. Much of the iron ore which is mined in the United States is carried long distances to points of consumption. The Lake Superior ore reaches plants on the Ohio river and even competes on the Atlantic seaboard with foreign ores.

Of the shipping ports, Two Harbors, in Minnesota, continued in the lead, shipping 5,018,197 long tons of iron ore, or over 1,000,000 tons more than the total in 1900. Escanaba, in Michigan, shipped over 4,000,000 long tons, holding second place; Duluth, in Minnesota, with a record of nearly 3,500,000 tons, ranked third; Ashland, in Wisconsin, was fourth, with a total of over 2,800,000 tons; Marquette, in Michigan, was fifth, shipping about 2,354,000 tons, and Superior, in Wisconsin, was sixth, with a little over 2,321,000 tons. Gladstone, in Michigan, shipped 117,089 long tons.

Of the ore of the Lake Superior region, 18,090,618 net tons passed through the canals at Sault Ste. Marie in 1901, an increase of 1,647,050 net tons, or 10 per cent. increase over the total of 1900. This total of iron ore was valued at the Sault at $58,794,509, or $3.25 a ton, and the rate per ton for the carriage of this ore averaged 78 cents, a reduction of 27 cents from the average rate of $1.05 in 1900.

Of the receiving ports on Lake Erie, Ashtabula, Cleveland and Conneaut ranked in the order named, each being credited with over 3,000,000 tons. Buffalo and Tonawanda, N. Y., together received nearly 1,500,000 tons, Erie, Pa., over 1,300,000 tons, and Fairport, O., over 1,100,000 tons.

For about five years there has been an interesting legal controversy concerning the freights to be charged for the haul from the Minnesota iron ore ranges to the docks. The Minnesota state railway commission demanded that the railroads connecting the various iron ore mines in the state with the iron ore shipping docks on Lake Superior, which were entirely within the limits of Minnesota, should file their tariffs, and they were then ordered to reduce these 25 per cent. on the ground that the ore transfer was business within the limits of the state. The railroad companies contested this claim on the ground that it was interstate business, and in November, 1901, the state commission admitted its lack of jurisdiction, thus ending this celebrated case.

The Cuban iron ore deposits occur in the southeastern part of the island, along the Caribbean sea, the principal operations being in the province of Santiago de Cuba. All these properties are owned and operated by United States companies, and practically all of the ore is brought to this country. The imports for 1901 were 552,248 long tons, as compared with 446,872 long tons in 1900. The total imports into the United States or iron ore in 1901 amounted to 966,950 long tons, valued at $1,659,273, or $1.72 per ton, an increase of 7.7 per cent. over the imports for 1900. The greater portion of this ore was received at the ports of Baltimore and Philadelphia, the amount for the two being 782,290 tons, or 81 per cent. of the total.

Nearly all of the iron ores exported from this country during the year 1901, 64,703 long tons, was sent to Canadian blast furnaces, which used these ores as a portion of the mixture fed to the furnaces.

WORK AT FORE RIVER.

All of the rigging of the seven-masted schooner Thomas W. Lawson is ready at the Fore River ship yard, at Quincy, Mass., and the sails have been finished. The work on the masts will be done in about a week. The Lawson's three deckhouses are up, and as she is to be rigged before launching the shears for stepping her masts and hoisting her heavy fittings into place are in preparation. A start has also been made on the building of the launching ways and on painting the schooner's hull, which will be white above the water line and red below.

The parts of the new 75-ton gantry crane at these works are being assembled along the fitting out basin and work on the concrete dock that will support it is being hurried so that everything may be in readiness to bring the cruiser Des Moines alongside as soon as she has been put over. The cruiser's ports and hawse-pipes have been cut, a specially designed machine operated by compressed air being used for the former. The caulking of the pine sheathing that covers the Des Moines below the water line is nearly done.

A new 24-ft. boring mill and a 72-in. planer are being added to the equipment of the machine shop.

Capt. Charles E. Clark has been advanced seven numbers by order of the president and his nomination as rear-admiral sent to the senate. Capt. Clark bore a conspicuous part in the Spanish-American war, bringing the Oregon under high pressure from the Pacific coast to Santiago without mishap.

It is understood that the Pure Oil Co. of Pittsburgh will establish its own transatlantic line. The Pure Oil Steamship Co. has just been chartered in Delaware to control two tank steamers now being built on the Clyde of 6,000 tons each.

COAL PRODUCTION IN 1901.

According to returns to the United States geological survey from producers representing fully 97 per cent. of the entire coal output of the United States, the production in 1901 amounted to 292,240,758 short tons ordered at $348,813,831. As compared with 1900, when the output amounted to 269,881,827 short tons, worth $306,891,364, this represents an increase of 22,358,931 short tons, or 8 per cent. in quantity, and $41,922,467, or 13.6 per cent. in value. The production of Pennsylvania anthracite showed a phenomenal increase, from 51,221,353 long tons (equivalent to 57,367,915 short tons) in 1900 to 60,242,560 long tons, or 67,471,667 short tons, in 1901. This represented a gain of 17½ per cent., the largest percentage of gain made by the anthracite trade in twenty years. Part of this increase in 1901 was due to a decreased output of anthracite in 1900 as compared with 1899, as owing to the historic strike of 1900 the output that year was reduced by over 2,500,000 long tons. The production last year shows an increase over 1899 of 6,297,913 long tons, and except for the strike of 1900 would have shown an increase over that year of 4,500,000 long tons, or about half the actual increase made.

The increase in the value of the anthracite product is still more striking, the amount received at the mines last year showing a gain of $27,746,169, or more than 31 per cent., over that of 1900. This was entirely due to the unprecedented period of prosperity, which enabled consumers generally to pay higher prices for their fuel. The average price for the marketed anthracite coal—that is, the product shipped to market or sold to local trade, and exclusive of the colliery consumption, which amounted to about 10 per cent. of the total—was $2.05, the highest figure obtained since 1888.

The production of bituminous coal, lignite, cannel coal, etc., including a small amount of anthracite from Colorado and New Mexico, increased from 212,513,912 short tons in 1900 to 224,769,091 short tons in 1901, indicating a gain of 12,255,179 tons, or about 6 per cent. The value of this product amounted to $236,309,811, as compared with $221,133,513 in 1900, an increase of $15,176,298, or a little less than 7 per cent. The price of the bituminous product did not show any material advance in 1901, the average being about 0.8 cent higher than in 1900. Of the twenty-seven states producing coal in 1901 all but four showed increased production. The four whose product decreased were California, Montana, New Mexico and Tennessee. The production by states is shown in the following table:

COAL PRODUCTION OF THE UNITED STATES IN 1901.

Bituminous.	Total product.	Total value.
Alabama	9,078,677	$9,987,811
Arkansas	1,784,136	2,033,193
California	151,079	394,106
Colorado	5,699,016	6,441,891
Georgia and North Carolina	354,825	426,658
Idaho	.....	.....
Illinois	27,313,296	28,452,278
Indiana	6,962,940	7,078,342
Indian Territory	2,406,943	3,887,793
Iowa	5,578,522	8,016,274
Kansas	4,880,526	5,973,381
Kentucky	5,487,994	5,208,094
Maryland	5,113,127	5,046,491
Michigan	1,040,530	1,543,756
Missouri	3,799,993	4,703,174
Montana	1,396,081	2,009,316
New Mexico	1,086,546	1,546,652
North Dakota	166,085	212,635
Ohio	19,695,723	19,789,958
Oregon	69,011	173,646
Pennsylvania	82,914,840	82,099,906
Tennessee	3,546,551	3,969,249
Texas	1,086,012	1,885,083
Utah	1,322,614	1,666,082
Virginia	2,953,999	2,523,270
Washington	2,578,217	4,271,076
West Virginia	23,816,434	20,908,705
Wyoming	4,485,374	6,060,462
Total bituminous	224,769,091	$236,309,811
Pennsylvania anthracite	67,471,667	112,504,020
	292,240,758	$348,813,831

The preliminary report issued by the inspectors of mines for Great Britain shows that the production of coal in the United Kingdom last year was 219,037,240 long tons, a decrease of 6,132,923 long tons from 1900. Reducing the product of the United States to the same unit, it is found that it amounted to 260,929,248 long tons, or 42,439,760 long tons (nearly 20 per cent.) more than that of Great Britain. The coal output of her colonies and dependencies (including India) aggregated in 1900 about 17,000,000 long tons, so that, taking all the British empire as one producer, it still falls short of the coal product of the United States last year by from 20,000,000 to 25,000,000 long tons. Our coal production last year was nearly 80 per cent. larger than Germany's, nearly seven times that of Austria-Hungary and more than eight times that of France.

E. & I. K. Stetson, Brewer, Me., are building a four-masted wooden schooner, to be christened Samuel W. Hathaway, for Crowell & Thurlaw of Boston. The schooner will be 181 ft. long, 39½ ft. beam and 19½ ft. deep.

A second large mortgage issued by the William R. Trigg Co., Richmond, Va., has just been filed in the chancery court. It is a lien in favor of the Richmond Trust & Safe Deposit Co. for a loan of $1,000,000, which is to be used in improving and enlarging the plant.

Latimer Stone, North Beach, San Francisco, Cal., is building a three-masted wooden schooner for the Humboldt Lumber Co. of Oakland. The schooner will be 155 ft. long, 35 ft. 6 in. beam and 10 ft. 6 in. deep.

GROWTH IN EXPORTS TO AFRICA.

The expected increase in the exports to Africa has already begun. The exports from the United States to Africa in April, the latest month for which the details of our exports have yet been received by the treasury bureau of statistics, were greater than those to all South America, and were more than 50 per cent. greater than those of April in the preceding year. For the ten months ending with April, 1902, they amounted to $28,956,179, against $22,070,133 in the corresponding ten months of the fiscal year, 1901, and $15,858,286 in the corresponding months of 1900. The chief increase, of course, is to British Africa, which takes about 85 per cent. of our exports to Africa. To British Africa alone our exports during the month of April, 1902, were $2,763,833, against $1,817,101 in April, 1901; and for the ten months ending with April, 1902, were $24,708,612, against $18,437,315 in ten months of 1901, and $13,168,062 in ten months of 1900. The prospective growth in the commerce of Africa and the probable increase in its consuming power with the return to peace and commercial activity are discussed in a statement furnished to the British South African Export Gazette by a leading Anglo-African merchant who had recently returned from a tour to South Africa. In this discussion the British merchant in question says:

"With regard to the future of trade, with the advent of peace, there will undoubtedly be a great boom all through the country. A lull consequent on the removal of part of the military forces and the refugees may perhaps affect the trade of Capetown, which is, and always will remain, more or less local, and concerned with the western districts of Cape Colony; but no such effect will be felt elsewhere, for it will be necessary for some considerable time to keep a large military force in the country, and this will as a consequence involve a continuance of a considerable amount of military expenditure. Large camps will be set up at certain points. I have no doubt as to the certainty of the boom which will supervene after the war, but my only misgiving is that, with everyone rushing in to secure a share, it will be overdone, and a reaction set in.

"As regards the Transvaal, and more particularly Johannesburg, no one with his eyes open can doubt of the great developments in mining and commerce which lie ahead. It is well known that, before the war, many mining properties were held back by those who foresaw what was coming and thought it better to wait until the trouble was over, rather than risk their chances under the then unfavorable economic and political conditions. The cancelling of all concessions and the reduction of the price of dynamite will unquestionably make it easier to work the mines at a profit, and many of the low grade properties will now be taken in hand and, what is more, made to pay. The chief danger that has to be feared is that arising from the opening which will be afforded for the launching of bogus companies, which can only create discredit and discouragement for bona fide concerns.

"The immediate future of the Orange River colony, although affording many hopeful indications, has, I think, several problems to contend with. The colony is a farming country in the main, and for some time to come will suffer from the depletion of population and the destruction of property, and as a consequence the loss of farming capital. Government assistance may do much to restore conditions of the earlier period, but recovery will be a work of time. Trade in the meantime will suffer. Rhodesia forms no exception to the rest of the country, and has, in my opinion, a big future before it.

"The question as to which of the ports on the south and east African seaboard will secure the bulk of future South African trade is, I think, not difficult to answer. My previous remarks as to the local nature of the trade of Capetown show that that port is out of the reckoning. The situation of East London and Port Elizabeth places both of those ports in a more advantageous position to cater for the interior trade than the metropolitan port. To Durban, however, I think will fall the bulk of at least the Transvaal trade, and that a very great future lies before it is unquestionable. It is the nearest of all the South African ports to the Rand, and owing to the high rents ruling in Johannesburg, merchants prefer to keep their stocks at the coast in bond. By this course they save the interest on the disbursement of money for the duties, drawing their goods from bond only as they want them. Delagoa bay may offer some rivalry on account of its slightly shorter distance and its through rate, and in the future will doubtless make further progress, but it will never be chosen voluntarily by merchant firms as a place of residence on account of the unhealthiness of the climate, and because it is a foreign port. Johannesburg merchants likewise, I should imagine, will never use it, like Durban, as a place to store their stocks at. It will remain purely a forwarding port, and a number of firms of forwarding agents may be established there. English merchants, and I should judge, American merchants also, will always prefer an English port to a foreign, and especially a Portugese port, on account of the unforeseen administration difficulties which are continually arising. If, as I think, Johannesburg merchants will continue to store their stocks at the ports in preference to removing them to Johannesburg, Durban will be the port chosen for this purpose, in which case its future is settled.

"Of course the reason for the preference of Delagoa bay over Durban by the Germans is that their ships, coming down the east coast, touch first at the former port. It must also be remembered that the German through rate to Johannesburg, via Delagoa bay, has enabled them to offer serious competition to British trade forwarded through Durban and other colonial ports; but this is a matter which our shipping companies will have to face by the institution of similar through rates via Durban. This, indeed, is the only way to do it. American, as well as British vessels, come round the coast from the west, and Durban is thus their proper objective rather than the Portugese port. Taking South Africa as a whole, the country will go ahead in coming years, and a big future lies before it. As to the immediate trade outlook, the impressions gathered from my visit are distinctly hopeful, tinctured with the fear that it will be overdone."

At a meeting of the shareholders of the Dominion Iron & Steel Co. and the Dominion Coal Co., at Montreal, a lease of the output of the coal company's mines was ratified. The lease is $1,600,000 per year and 7½ cents a ton royalty on all coal mined in excess of 35,000,000 tons in any one year.

REPAIRS TO THE ETRURIA.

During the next six weeks the attention of the ship builders of Great Britain will be directed to the tests of pneumatic tools to be held under the auspices of the Chicago Pneumatic Tool Co. at Greenock. The same tools which were used in repairing the Etruria will be employed. This brings direct attention to the work which was done upon the Etruria. It will be recalled that this celebrated vessel lost her rudder, rudder post, propeller and the external portion of her propeller shaft in mid ocean, leaving her helpless hundreds of miles from port. Under the circumstances all that could be done to keep the leviathan in hand was to construct a jury rudder of spars and planks to serve until the friendly assistance of a passing Leyland liner, William Cliff, enabled the vessel to be towed to the Azores. According to the Engineer of London, when the Etruria reached Liverpool the Cunard Steamship Co.'s engineer-in-chief, Mr. Bain, decided to take in his own hands the work of repairing the damage done, a good idea of the task being shown by the sketch Fig. 1, the hatches portion of which represents the parts lost in mid ocean. It was seen that this was just one of those undertakings where compressed air could render valuable assistance, as the pecuniary loss caused by such an important member of the company's fleet standing idle for any length of time, added to the heavy rental charged for the use of a huge dry dock, was a matter of considerable moment. The services of the new Taite-Howard Pneumatic Tool Co., Ltd. (English branch, Chicago Pneumatic Tool Co.) were therefore accepted. This company provided the whole of the compressed air plant and certain skilled hands, and the Cunard company provided the material and most of the labor. The result was that the whole of the work was executed in about a fortnight.

The rudder, rudder post, and the lower part of the stern post being lost, a new forging for the rudder post was provided by the Dumbarton Forge Co. Owing to the enormous size of this forging—Fig. 2—it was made in two portions joined by a scarph A at the bottom of the rudder post—Fig. 3—the scarphs on the forgings being made to template. The corresponding scarphs of the top and bottom stern post were made by pneumatic tools. A number of holes was drilled through the stern post by Boyer drills, and the intervening metal was next broken through by a No. 1 Boyer chipping hammer, using a tool of the shape shown in Fig 4. It will be noticed that the tool is thickened towards the end, in order to prevent it binding. The drilling of the scarph A was commenced at 9 o'clock p. m. on Saturday, and was finished, with the bottom piece cut away, at noon on the following Tuesday; two No. 2 Boyer drills, with 1¼ in. diameter drills, and one No. 3 Boyer drill, with 1 in. diameter drill, being employed, the latter boring at the rate of 1¼ in. deep per minute. In one case, we are informed, a 1-in. hole was drilled 9 in. deep in seven minutes. The No. 2 drills, 1¼ in. diameter, were boring ⅞ in. deep in one minute on an average. After the holes were thus broken through, the remaining metal was chipped to template by pneumatic hammer and chisel, the time occupied in this process being about thirty hours. The forgings were next clamped in position without much further tooling being necessary to make a good joint. Some heavy drilling was then rendered necessary for the rivet holes, of which there are twenty-four in each of the two lower joints A C, Fig. 3, and fifteen in the upper joint B. These were drilled 1 5/16 in. diameter, and were afterwards reamered out by the same machines to 1½ in. diameter, great care being taken to prevent any movement of either of the abutting parts. Ordinary twist drills 1 5/16 in. diameter were used, and with 100 lbs. air pressure a hole 12 in. long was made in 55 minutes, including four stops to lower down the drill on to the stand. The countersinking was done with the same machines, by the aid of a special tool, with a cutter to fit the drill socket. The rivets—Fig. 5—were 11¼ in. long, 1½ in. diameter, the heads being 2¼ in. diameter and 1¼ in. long, and the other end of the rivet had 2¾ in. of taper. They were made in the Cunard company's shops, accurately turned to fit the holes tight.

After the holes in the scarph A were finished a start was made with the riveting, two Boyer riveters 1¾ in. by 6 in. being used simultaneously from each side of the scarph. A couple of plates were clamped to the rudder post to provide a bearing for the riveters, and the machines were supported by means of balance weights running on pulleys fixed above the scarph. After being heated the rivets were cooled in water to within 3 in. of their tapered ends, and were then driven into the holes by the machines. When the operator at the opposite side saw that the countersink was fairly filled he started his machine, and in an average of from thirty to forty-five seconds the rivet was close down to the metal. The subsequent cooling of the ends of the rivets caused them to contract, and tended further to close the joint. In the two joints B and C, Fig. 3, the heads of the rivets were afterwards chipped off with a Boyer hammer to allow of the plating to be fitted closely over them. In the case of joint A this was not necessary. Some heavy chipping was necessary after the scarphs were riveted to trim the forging up to shape at the joints. As an instance, we may mention that in one case a surface 16 in. wide and ¾ in. thick tapering to nothing had to be removed by the pneumatic tools.

The repairs necessitated the removal of a number of the skin plates of the vessel, which involved a further large amount of punching and riveting. The keel plate on either side which overlaps the rudder post, for instance, is 18 ft. long by 4 ft. deep and ⅞ in. thick. Along two sides of these plates two rows of ⅞ in. rivets had to be removed and replaced. This was done by hand riveting. Along the bottom and on either side of the frame there are three rows of 1¼ in. rivets, varying in length from 5¾ to 13¾ in., and pitched 6 in. center to center. These were replaced by pneumatic tools. Where the outer edge of these plates overlapped the stern post two rows of screw rivets were inserted by hand.

The compressor was placed transversely on the deck of the vessel near the stern, three india-rubber hose pipes of 1 in. bore being carried over the vessel's side down to the tools. The compressor was one of the Taite-Howard company's standard types, and was supplied with steam from one of the ship's boilers. It may be stated that no difficulty was experienced with the workmen, the Cunard company's boilermakers handled the tools with some eagerness both when riveting the 1½ in. rivets and also when doing the heavy chipping.

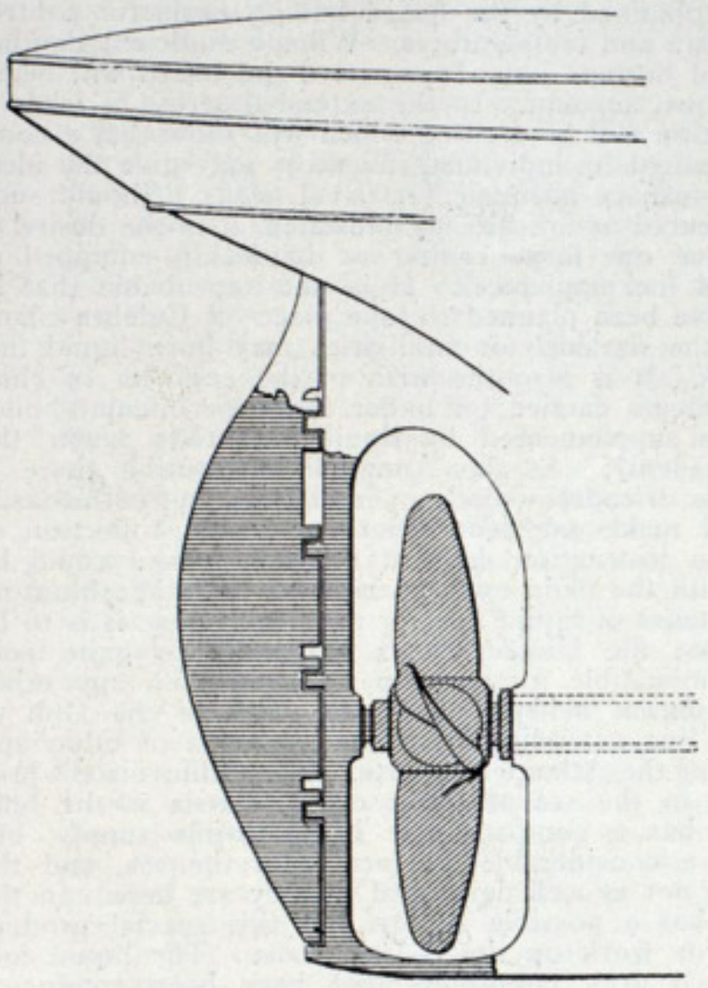


Fig. 1—STERN OF ETRURIA, SHOWING PORTION LOST

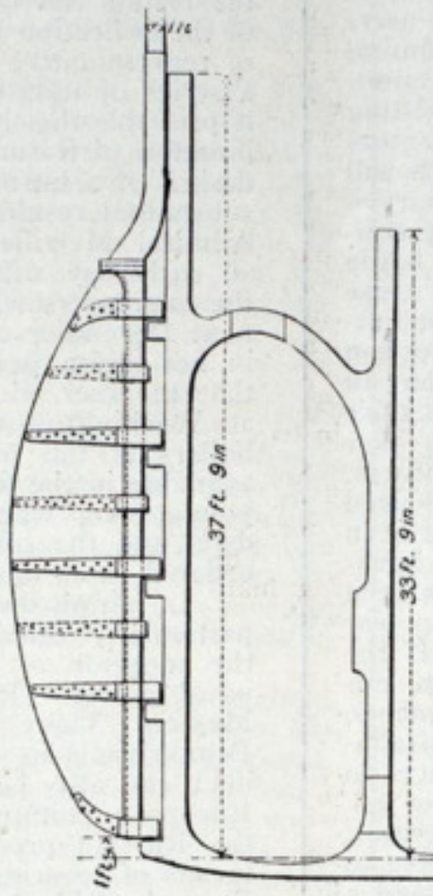


Fig. 2—NEW RUDDER AND FRAME

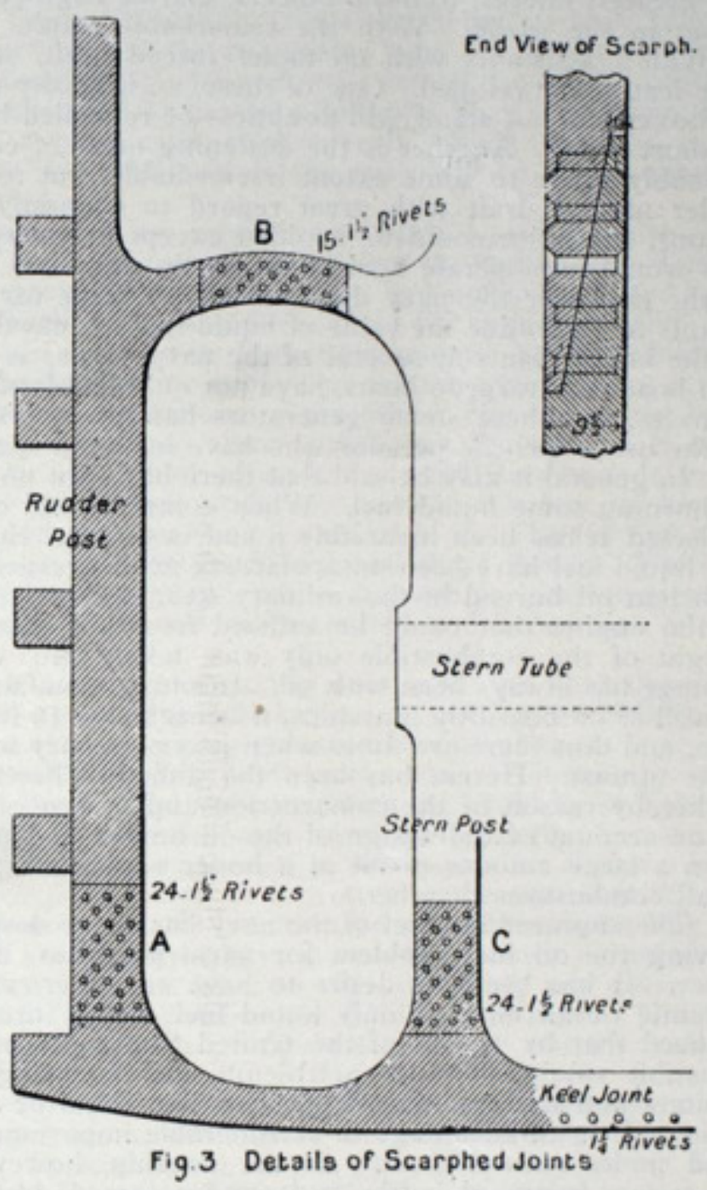


Fig. 3 Details of Scarphed Joints

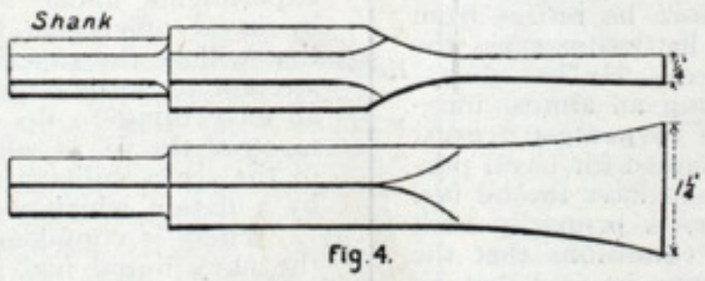


Fig. 4.

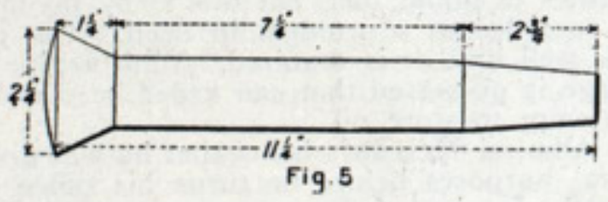


Fig. 5

REPAIRS TO THE ETRURIA.

SHIP YARD NOTES.

At Hay & Wright's ship yard, Oakland, Cal., the barkentine Fullerton has just been launched for the Union Oil Co. The vessel's dimensions are: Length, 252 ft. over all; 235 ft. keel; 42 ft. 6 in. beam; and 21 ft. deep. She is said to be the largest wooden vessel ever constructed on the Pacific coast.

The houseboat Nirohda, owned by Col. Sheffield Phelps of Englewood, N. J., was launched Saturday afternoon from Marvel's Ship Yard, Newburg, N. Y. The vessel is 125 ft. over all, 23 ft. beam and 8½ ft. deep. She will draw 3½ ft. of water.

The Townsend & Downey Ship Building & Repair Co., Shooter's Island, N. Y., has just closed a contract with the Cornell Towing line for a large steel tugboat for service at New York. The tug will be 141 ft. long on the water line.

Bids have just been opened in San Francisco for repairing the transport Grant. They were all in excess of $400,000 and it is not believed that the department at Washington will justify the expenditure of so large a sum of money.

NOTABLE ADVANCE IN LIQUID FUEL EXPERIMENTS.

The New York Tribune, under date of June 14, publishes the following article regarding the experiments of the navy department with fuel oil:

Admiral Melville announces a notable advance in oil fuel combustion, which indicates that the navy may soon dispense with coal. A board of engineers under his direction has succeeded in producing one-third more steam from a standardized boiler with oil than was possible with the best coal, and it is thought that the use of liquid fuel is on the point of tremendous development for marine purposes. In careful tests, extending over a whole year, the value of coal as a fuel has been accurately determined, and in the last week the same boiler has been fired with oil in the preliminary series of exhausive tests, which will last several months. The results from the first have astonished the skilled experimenters, and while the wild claims of oil boomers are in no likelihood of verification, it seems almost certain that oil fuel will supersede coal as a controlling element of naval warfare. Afloat the supply problem is altogether different from those encountered ashore. In the crowded complication of a warship, where cubic space and weight are the all powerful considerations, the aim is to evaporate the greatest quantity of water in the smallest boiler with the least weight of fuel, and usually without regard to expense. The water-tube boiler, adopted three years ago, cut down the weight and volume of the steam-producing apparatus, and its higher pressures enabled some saving in the relative weight and size of propelling engines; but the size of bunkers and the weight of coal were increased until coal was not successfully burning under forced draft, and the use of it aboard ship would have compelled the adoption of larger and heavier boilers, greater bunker capacity and other prohibitive conditions.

Now Admiral Melville announces the disappearance of most of these objections to oil, and the tests just beginning in Washington become of the greatest interest to naval officers, marine engineers and all steam users afloat in the world. With the remarkable results achieved by Admiral Melville's assistants with oil under forced draft, several new objectionable features developed. One of these, an intensity of heat which existing fireboxes will not stand, will doubtless be remedied by American inventors in short order. Another is the deafening noise of combustion, which will probably prove to some extent irremediable, but as oil would be burned under natural draft with great regard to economy under cruising conditions, the noise could be avoided except in emergencies, and in battle this would not operate against its use in warships. Ever since the close of the civil war the navy department has made earnest but desultory attempts to determine the value of liquid fuel for naval purposes. A portion of the boiler plants at several of the navy yards, as well as the boilers of gun boats and torpedo boats, have not only had liquid fuel burned in their furnaces, but these steam generators have been temporarily turned over to the use of private persons who have invented special forms of burners.

In general it may be said that there has been no difficulty experienced in burning some liquid fuel. When complete and careful data have been collected, it has been invariably found in the past that the results in burning liquid fuel have been unsatisfactory in this respect—there has not been sufficient oil burned in the ordinary steam generator to secure the power at the engine that could be utilized from the burning of coal. If the weight of the combustible only was taken into consideration, the advantage has always been with oil. In most manufacturing establishments, as well as on board the warships, it is necessary to limit the boiler installation, and thus there are times when it is necessary to force the furnaces to their utmost. Herein has been the difficulty heretofore of burning oil. Either by reason of the construction and design of the steam generator, or on account of the design of the oil burner, it has not been possible to burn a large amount of oil in a boiler which has a small furnace and a small combustion chamber.

The engineer in chief of the navy has never despaired of satisfactorily solving the oil fuel problem for naval purposes before he retires from office. It has been his desire to have an American battleship cross the Atlantic ocean burning only liquid fuel in her furnaces. He has always realized that by reason of the United States possessing an almost inexhaustible supply of crude petroleum, the navy ought to possess a great military and strategic advantage if oil fuel could be adapted for naval purposes. It is an advantage of considerable importance to have the oil fuel used under natural draft. As the warship, however, is primarily built for a few hours of battle, it is under forced draft conditions that the use of oil would be most advantageous. In fact, it may be said that oil fuel is valueless for naval purposes unless it can be used under heavy forced draft conditions.

About a year ago, through the enterprise of the Oil City Boiler Works Co., a water-tube boiler of the Hohenstein design was turned over, complete in all respects, to the bureau of steam engineering for experimental purposes. The limitations of this boiler as to weight, floor space and height were identical with the requirements of the Denver class of cruisers—requirements that are probably more severe in their limitations than any others demanded in any warship of the navy. For one year a board of naval officers, consisting of Lieut. Comd'r John R. Edwards, W. M. Parks and F. H. Bailey, has been experimenting with this boiler. Draughtsmen of the bureau of steam engineering were employed to collect data in the various tests. These tests have been under all sorts of practical conditions—natural draft and forced draft of 1 in., 2 in. and 3 in. of air pressure. The best, as well as the average, quality of coal has been used.

The coal consumption has varied from 18 to 70 lbs. a square foot of grate. The detailed results of these tests will eventually be published by the bureau of steam engineering. The experimental boiler furnished by the Oil City Boiler Works has been of such design that has been possible to make the furnace volume as large as possible, and this gave the opportunity for Admiral Melville to determine whether the character of the steam generator had anything to do with the burning of liquid fuel. In order to settle this question every test that has been made under the experimental boiler with coal will be duplicated with oil fuel.

There is widespread interest in Admiral Melville's purpose to conduct an extended series of tests in burning liquid fuel. Not only from Texas, but from California, offers have been received to furnish the oil free of cost. Manufacturing firms have offered to send their own experts to attach their patented oil burning appliances to the experimental boiler. The naval appropriation bill contains an item of $20,000 for this special purpose. There is also a small unexpended balance of a previous appropriation for liquid fuel purposes which is available. Preparations for the oil fuel tests have been under way for several months. Two official trials have been conducted this week under the supervision of the same board of naval officers who carried on the coal tests. The first test was under forced draft conditions, where an air pressure of 1 in. was used. All the data collected in this test were checked and counterchecked, so that indisputable results were secured. The second test was also under forced draft conditions with an air pressure of 2 in., and the same care was taken in the collection of the data.

In both cases it was found that the volume of steam generated by the oil was greater than that secured by the coal test of like character. It will be understood that in these tests no attempt was made to determine the efficiency of the combustible. The primary purpose was to evaporate a large quantity of water, or, in other words, to secure a large volume of steam independent of the cost. Under forced draft conditions, whether coal or oil is used, economical results cannot be expected. The two official tests that have already taken place show that the board of naval officers has secured a greater output of steam with oil than was obtained with one of the best qualities of Pocahontas coal. Compared with like conditions when coal was used, the efficiency of oil is 40 per cent. greater than that of coal. The experiments, however, will be conducted for a considerable period, for not only will various qualities of oil be used, but many forms of burners will be tried.

In view of the fact that there are hundreds of forms of burners, it will only be possible for the experimental board to try the representative types. Individual inventors will be expected to attach their burners at their own expense and according to their own designs to the test boiler. The manner and character of the data to be collected will be solely determined by the experimental board. Comparative and valuable results can only be obtained by the board having exclusive control of the collection of all data and temperatures. When a sufficient number of representative types of burners have been tested the board will begin a series of tests on its own account. In the extended series of trials it is probable that information will be secured which will show that a combination of features presented by individual inventors may give the ideal design of a burner and furnace adequate for naval needs. Should such substantial results be secured as are already indicated, it is the desire of Admiral Melville to have one large cruiser or battleship equipped at an early day with liquid fuel appliances. It is not improbable that in the maneuvers which have been planned to take place off Culebra island next December one of the warships or auxiliaries may burn liquid fuel in her steam generators. It is also the wish of the engineer in chief that the fuel oil experiments carried on under the experimental boiler at Washington may be supplemented by liquid fuel tests under the boilers at the naval academy. At the Annapolis institution there is available in the first class of cadets a body of intelligent and enthusiastic young men, who would make excellent observers in the collection of data, and the officers on instruction daily at that institution would be ordered to co-operate with the main experimental board in Washington.

In noting the advantages of liquid fuel for naval purposes, it is to be particularly observed that the United States has more to gain from the adoption of this combustible for warship purposes than any other naval power. The Beaumont field is within 40 miles of the Gulf of Mexico. There is pipe line extending from the oil fields of Ohio and Pennsylvania to several of the Atlantic seaports. The California oil product can also be piped to the sea at slight cost. Russia is the only European country that has a comparatively inexhaustible supply, but the Russian product is a considerable distance from the sea, and the means of securing it are not as well developed as they are here. In the Burmah field England has a possible supply, but this special product could only be utilized for work on the Asiatic coast. The liquid fuel experiments under forced draft conditions that have been conducted by naval officers in the last week promise much in insuring warships that will be the superiors of any afloat. It is true that other nations may attempt to store large quantities of liquid fuel, but this is by no means an easy thing to do. It is regarded as a problem in itself. The place to store the oil is within the well until it is required. With a pipe line to the sea a military advantage is possessed that can never be overcome by a nation which would attempt to store oil.

There is confidence that Admiral Melville's belief that he will give to the navy liquid fuel for naval purposes before he turns his office over to his successor will be realized. In view of the results announced above, there is much more than a probability that it will not be long before an American warship will make the Atlantic voyage using liquid fuel under forced draft conditions.

ONLY ONE SPECIAL SEASHORE EXCURSION.

Only one special excursion to the seashore will be run via Pennsylvania lines this summer. The date fixed for it is Thursday, July 31. On that date special rate round-trip tickets to ten of the most attractive seaside resorts along the Atlantic coast will be sold and special through car service will be arranged for the convenience of persons wishing to visit Atlantic City, Cape May, Avalon, Anglesea, Holly Beach, Ocean City, Sea Isle City, Wildwood, New Jersey, Ocean City, Maryland, or Rehoboth, Delaware. The return limits on tickets to either resort will cover the customary ten days vacation. For special information regarding fares, etc., consult nearest ticket agent, or address C. L. Kimball, A. G. P. A., Cleveland.

Mr. J. C. McDowell of the J. M. Guffey Petroleum Co. says that his company will need one new ship a month for some time to come. He says that the production of the Texas field is already as great as that of Pennsylvania and that the company's plans have grown far beyond its original intentions.

The Ameriran Turbine Engine Co. of New York has been incorporated with a capital stock of $500,000 to manufacture turbine engines and appliances pertaining thereto. The directors are Hamilton E. Brown, Maurice L. Muhleman and Eugene M. Hoffman, all of New York.

The auxiliary cruiser Dixie, which has been in service as a training ship, is to be converted into a hospital ship. She will take the place of the Solace, used in the Santiago campaign as a hospital ship.

LOUIS NIXON ON THE BATTLESHIPS OF THE FUTURE.

Mr. Lewis Nixon of the Crescent Ship Yard, Elizabethport, N. J., in an article upon the subject, "The Battleships of the Future," says:

"There is one possibility that makes anything like an accurate forecast of the type of warship of the future very difficult. This is the chance that there may come at any moment a complete revolution through the discovery of some agent of propulsion that will do away with coal and the steam engine. At present the stowing of machinery and the carrying of coal in a measure controls absolutely the construction of our ships. The room occupied by these two all-important elements is enormous and dictates arbitrarily construction along certain lines. Venturing on the future nothing positive can be laid down, because we do not know how long the present system of fuel and machinery will endure. The use of compressed or liquefied gas, or gas made on board ship in boilers or vessels, is a possible development which will save weight and men and simplify boiler arrangement, even with steam boilers and engines as they are now. The nineteenth century was the age of invention. The human mind today is in a state of intense activity, and developing by its experience during the century just closed. It is fair to presume that it will bring forth new inventions at a much more rapid rate. At this time, however, there is not in sight anything that would give us even a clue as to what we may expect in the way of a new driving power. Electricity, liquid air, compressed air, gas, or any one of a dozen forces may be developed over night, so to speak, in a manner that will compel the complete remodeling of our enginery both on land and sea. Naturally this would bring a type of war vessel entirely different from what we have at present. But a nation to be abreast of the times cannot speculate in future developments. It must take advantage of the best existing conditions and work up to them if it desires to control at sea. So far we have done this admirably in the new American navy.

"For a generation past the creation of a battleship has been as conventional as the trimming of a hat. The trimming may be varied here and there and the shape slightly altered, but the frame always remains about the same. The battleship has been of slow growth and there have been few radical changes. Take the Ironsides and the Monitor; form a composite of the two on steel brought up to the time of the Inflexible in armor and gun and you will be surprised to note the similarity. Yet the two types were twenty years apart. The Inflexible, barring modern guns, does not differ greatly from the battleships of the present. Hence, it is in the factors going to make up the battleship that we must look for the probable changes that will be made in the vessels themselves. As to these factors naval opinion in America at least is radically divided. Pick out five of the brightest officers of the service and ask them whether a battleship should have a high freeboard or only enough for seaworthiness; whether she should have turrets at all or only barbettes; whether speed or armament is the most important; and it is quite possible that one may get five different opinions. This does not mean that battleships are inefficient. They are all good and the merits of particular factors must be proved in the supreme test of battle. No nation can have too many battleships if it aspires to world power.

"It has been asserted by eminent contractors that we are approaching an era where armor will be subordinated entirely; that the battleship of the future will depend upon speed and quick handling for defensive purposes. I look to see a constant development of armor, an increased rather than a decreased protection. The tendency has been right along to protect more and more, and ultimately, I believe, there will be on a battleship no exposed parts where men are stationed. Those who suggested the sacrifice of armor in the interest of speed forgot that the first duty of a battleship is not to insure her own safety but to destroy her opponent. She is essentially a fighting machine.

"Battleships are like prizefighters. They go into the ring to fight to a finish and realize that they must be prepared to take many good blows in return for those that they deal if they want victory. Armor being a measure of endurance, the more a ship carries the better she is to take blows and the better able to administer punishment at short range—the most effective range. The armor and the gun have so far kept pace with one another very well. The plate can be made thick enough to resist any gun, but today such plate is too heavy to carry, so the gun is perhaps ahead. From the time that explosive shells first came into use armor became imperative. In the days of solid shot it made no particular difference whether a vessel was pierced or not, unless at the water line. The shot seldom hit anyone inside, and the holes made in the vessel were plugged up with comparative ease. Even chain shot was not fatal to a sturdy vessel, nor impaired seriously her fighting qualities, but a shell carrying a high explosive is a different proposition. If one of these pierces a vessel it practically means destruction to all in the neighborhood where the shell strikes, as well as the danger of fire. Therefore it is necessary to take protective measures that will explode these shells on the outside, and such protective measures are found only in armor, and ever increased armor. If there should come a time when there is discovered a projectile that nothing can resist or that is so powerful that protection against it would involve armor of such thickness as to make a battleship an inert mass, then we may expect to turn from armor and depend upon an overwhelming battery, but at present nothing of the kind is in sight.

"However, we are only at the threshold in the matter of explosives. There is certain to come more rapid development along these lines. Also we may confidently look for a striking advance in the matter of propulsive power to regulate the discharge of shells. Smokeless powder has marked an important step and is now at a high state of efficiency. It has enabled us to reach a point where we have reasonable control over our projectiles. We can now tell the powder to do what we want and as investigation progresses we will be able to control this force absolutely. In discussing smokeless powder it is a common error to attribute its value chiefly to its smokeless quality. This is merely an incidental value except for riflemen; the main value is that in smokeless powder we secure perfect combustion. We are relieved of the necessity of carrying round a great bulk of matter of which a large per cent. is useless, serving merely to darken the atmosphere. The smoke seen in common powder is that part of the substance which remains unconsumed and therefore useless. The smoke is made up of particles of certain unconsumed ingredients of the powder that float in the air. The idea in powder is to have a substance that shall have powerful propulsive effect at a very low degree of heat.

"It is the heat that plays havoc at present with our guns, so that the life of a gun is perhaps seventy-five discharges. At the end of that time the interior of the gun barrel is all torn and seamed and the weapon is useless. A new form of gun in which practically all the energy of the charge is imparted to the projectile is the ideal after which all inventors are striving at present. Even in the most advanced types much energy is lost. An increased range in our guns is made difficult by the fact that we are handicapped by certain mechanical difficulties that limit the length. When a gun is too long it is impossible to prevent it retching under the impact of the exploding charge, thereby lessening the effectiveness of aim. This may be overcome by powerful trussing so that the gun barrel will be perfectly supported and held rigid, but even then there is a chance of a disturbance that will interfere materially with the aim; consequently guns cannot be lengthened indefinitely nor the range indefinitely increased.

"In the matter of explosives a good indication of what might be expected in the future are the 'thunderbolts,' as the Spaniards called them, hurled by the Vesuvius against the Cuban fortifications. So far no great range is possible in discharging projectiles of this class, the problem of giving a sufficiently strong impact to insure long flight without exploding the material with which the shell is loaded not having been perfectly met. But progress along that line is rapid, and in the next war we may be reasonably certain that high explosives will be thrown from powerful guns at long range. Along this line various suggestions have been made that noxious gases may be used in the future for some forms of shells. Humanity will probably not permit the employment of such forms of offensive warfare, but I certainly believe that some form of gas, which produces insensibility, will be developed as the air ship comes into use and perhaps before.

"I have no doubt that soon electric influences will be projected and that the metal work of an enemy's guns may be able to transmit shocks to those serving them. The most important factor we have at present to influence the future navy is the submarine boat. It is a peculiarity of this new addition to our fighting force that its influences will be outside itself. By that I mean that, so far as the submarine boat is concerned, it is at the very outset a practically perfect craft. Such changes as will be brought about by its enrollment in the navy will be in the conditions to which it is opposed.

"I was challenged a few months ago when I said that the submarine boat was less of an experimental vessel than the battleship. This seemed an unreasonable proposition to those who had not investigated it, in view of the fact that battleships have been afloat for centuries, while the submarine boat has not yet seen its first engagement. Nevertheless this view is tenable. We know that the submarine boat is practically a perfect type of its class because of limitations of the field. The submarine boat must be able to go at a fair speed above and below the water. It must dive successfully and be capable of going in a straight line at a desired depth, and when it fires its torpedo under water must not lose its longitudinal stability. This is all that has yet been asked of it. The type of submarine boat which we have—the Holland—does all these things. Therefore, we are perfectly safe in saying that, unlike battleships, the opportunities for extension or development are more limited and hence less likely to be made.

"The problem we are confronting now is to find something that will give us protection against the submarine. At present we believe nothing. The only measure that an enemy menaced by one of these boats can take is flight, and battleships are not built to run away. Therefore some of the greatest minds of the day are wrestling with the problem of finding something with which to combat this new form of offense that has been sprung on the world. It has been suggested in some quarters that the bottom of war vessels be heavily armored as a protective measure, but this proposition has met with no favor. It would mean an additional loading down of our ships, which are already carrying as much armor as weight can be spared for. Experts are not wont to view favorably any device that will retard the speed or further cumber our fighting machines. But whatever the influence of the submarine, I doubt that it will change materialy the general type of the battleship.

"One thing is certain and that is that as naval equipment advances there will be a concurrent advance in the relative cost. This is shown very conclusively by experience in the past. The expense of firing 100 rounds from the 13-in. guns of the battleship Massachusetts in ammunition alone would exceed the entire cost of the old Constitution battery in 1812, with ammunition enough thrown in to fight all her batteries. The development of our new colonial policy will greatly influence the navy of the United States, both in regard to numbers and types. We have entered into active competition for the world's markets, and we have to face a severe commercial rivalry with other nations. This condition enormously increases the chances of war. Its bearing will be direct and specific in developing both the type and character of the navy."

TRADE NOTES.

An order from the government for one of their large bevel saw machines to be used at the Norfolk (Va.) navy yards has just been received by the Atlantic Works Incorporated of Philadelphia.

The steamers Washtenaw, Argyll and Progresso have been chartered through F. H. Weeks, marine broker, of 32 Broadway, New York, to carry crude oil in bulk from Sabine Pass, Texas, to Atlantic coast ports. The charter is for five years and the ships will be brought round from the Pacific and altered as rapidly as possible.

Mr. J. C. Stewart, the American contractor, whose record bricklaying performance in connection with the erection of the British Westinghouse Electric & Mfg. Co.'s works at Manchester, England, recently caused so much discussion, has been engaged by the Midland Railway Co. to supervise and expedite the work at the mammoth Midland Railway hotel at Manchester. The contract is in the hands of Messrs. William Brown & Son of Salford, England, and it is said that they are to receive $100,000 in bonuses if the work is finished within a year, and $10,000 a month for each month shorter than that time. The total price is $5,000,000.

It is announced from Belfast, Ireland, that the harbor board of the city has voted £299,000 ($1,495,000) to construct a graving dock 800 ft. long, capable of accommodating the vessels to be built by the shipping combine.

STRENGTH OF THE SHIPPING COMBINATION.

The strength of the Morgan shipping combination lies in its railway connections. The fact that it has feeders to the coast, the fact that it can quote a through rate from St. Louis to Liverpool is the advantage which it has over independent ships. Were it not for this we would not be inclined to regard the combination as a conservative organization, because, undoubtedly, the ships have been bought at a very high figure. However, the great railway interests wanted ocean ferries and it was probably just as cheap to buy as to build—probably cheaper, as it gave the added value of instant possession. There has been a lot of nonsense published in the English papers about parliamentary interference, as though any act of parliament could possibly destroy the right of any man to dispose of his own property. This is what has been done in the case of the White Star line. A certain number of individuals sold their shares, which were as absolutely their own property as their clothes, for cash and redeemable securities. The combination has a working arrangement with the German lines which caused the Berlin correspondent of Reuter's to send the following telegram to London: "The emperor, after the recent meeting of the Hamburg-American Steamship Co. at Hamburg, sent a telegram to Herr Ballin, the managing director of the company, warmly congratulating him upon the part he has taken in preserving national interests." This telegram has thoroughly roused the ire of Fairplay of London which has, all along, taken the common sense view of the shipping combination. Fairplay says:

"Is it not funny how mighty proud of themselves the Germans are over a transaction in which they certainly have the thin end? The kaiser cackles like the traditional fowl who thought the sun had got up to hear him crow. And why? Because Mr. J. Pierpont Morgan has kindly refrained from insisting that the German lines should do what he does not want them to do, and what, in any case, they would not be allowed to do—hoist the American flag. But then he does not insist that either the White Star of the Dominion lines should haul down the Union Jack, for these lines 'preserve the national interests' quite as much as the German lines will do, as long as the Morgan syndicate hold the levers in New York. As far as the sentiment of the flag is concerned Kaiser Wilhelm has no more reason to exult than has his uncle King Edward. And where the marvelous sagacity and dauntless patriotism of the German—of which we have heard so much from most German, and some English, newspapers—come in, we are unable to perceive. The British companies have got rid of steamers—some out of date, some which will be outclassed in a year or two, and most of which are unsuited for any other than the Atlantic trade—at many times their value, and at enormously more than any sane ship owner on this side of the Atlantic would give for them. And, while disposing of their property at a splendid price in cash and redeemable securities, they may retain as long as they like an interest in a combine which is designed to make great profits by economies, by the elimination of competition, the co-operation of American railway companies, and by the elevation (if possible) of freights and fares. To the prospective profits of this combine the German companies are to contribute all the net earnings on one-fourth of their capital—even if these earnings should be, in the Morgan millennium, as much as 20 per cent., or more. Therefore the British companies, so long as their interest in the combine remains, will obtain a share of the German profits, after comfortably disposing of their own expensive and otherwise unsaleable ships. The German companies retain their ships, and obtain a guarantee of a dividend of 6 per cent. upon one-fourth of their capital, even if no profit be earned by the combine. But if the combine loses money the German companies will not make any, and whatever the German companies do make at any time over 6 per cent. on one-fourth of their capital will be gobbled up by the combine. Moreover, the German companies may not extend their present services between Great Britain and America, and may not establish new services, without the consent of the Anglo-American companies. And when they are permitted to establish new services the Anglo-American companies are at liberty to establish similar services with German ports. In short, the German companies are bound hand and foot to the combine, with whom they must pool their passenger freights and share their profits. But they keep their boats, and will have to keep them until they are broken up for old iron. Is there a single individual shareholder of the Hamburg-American line who would not gladly exchange places with a shareholder in the White Star line? And does anyone know how many shares are already held by Mr. Morgan and his friends in the Hamburg-American line, whose manager has been congratulated by the Kaiser for preserving the German 'national interests?'

"We are too much accustomed to have the superior commercial enterprise of Germany advertised by Lord Roseberry, Mr. E. E. Williams, and others. We are too much accustomed to the arrogance of German statesmen and military men, who pose and prate as if Germany possessed a monopoly of all the virtues, and that all other peoples must take a back seat. But in this shipping deal she has come off not only second best, but a bad third. And the funny thing is the assiduity with which her public writers are striving to persuade themselves and the world that she has majestically placed one foot on the neck of the American eagle and another on the tail of the British lion. It is still more funny that British men, or, at all events, writers in British newspapers, should believe them, as they seem to believe everything which suggests the decay and general idiocy of their own nation. What with 'American methods' in manufacture and 'German enterprise' in trade, poor old Britannia is not to be allowed to make salt to her kail. Yet she comes out once more on top, and that extremely sagacious and patriotic person, Mr. W. J. Pirrie, has so arranged that we, or at all events, he, shall continue to build and maintain the ships that are to rob us of our ocean birthright in the future—yea, even for that eminently Teutonic and patriotic concern known as the Hamburg-American Steamship Co. And yet we find one newspaper correspondent writing from Berlin that the text of the Morgan-German agreement was held back from publication because the syndicate was 'afraid that a premature publication of the stipulations so favorable to the German companies might have seriously endangered the conclusion of the agreement with the White Star line by starting in England a fresh national agitation against it, considering the fact that the White Star line has not secured the same advantages.' Apart from the gross travesty of facts, what 'national agitation' has there been, or could there be, in England to prevent each individual shareholder in the White Star line from accepting an offer made him for the purchase of his shares at a price unthought of in his wildest dreams? Has there been any 'national agitation' against Mr. Croker of Tammany Hall buying race horses in England, or against Mr. Carnegie of the steel trust buying a castle in Scotland? Note again the Vienna correspondent of the Times. 'There is excellent reason to believe that certain exalted personages have not hesitated to exercise directly the influence which they enjoy in the highest quarter in England in order to strengthen the impression that Americans are really aiming at the destruction of British shipping supremacy, and to contrast with the patriotism of the German ship owners (!), who have subordinated their financial interests to the national interests of the Fatherland, the selfishness and supineness of the British ship owners, who have thought only of making a good bargain for themselves.' Oh ye gods and little fishes! Why does not 'our own correspondent' at Berlin tell us that 'the managers of the Hamburg-American line and the Bremen Lloyd made the best bargain they could?' Great Britain has no reason to envy either the American or the German share in a bargain which has created commotion far out of proportion to its importance.

"It is disappointing, not to say exasperating, that all the controversy over the Morgan deal has not sufficed to make clear to the British public the real disabilities under which British shipping lies. Our maritime supremacy is threatened, not by American methods, or German enterprise, but by our own laws. Red tape, circumlocution, and fussy and irrational officialism will kill our shipping industry, if we do not mind, much more effectually than American dollars can do. And yet on the motion last week to reappoint the house of commons committee on shipping subsidies, Mr. James Caldwell objected, because last year the committee devoted too much time to inquiry into the interests of British ship owners. How would Mr. Caldwell separate the interests of British ship owners from British shipping, and vice versa? We are not aware of any yearning desire for subsidies on the part of British ship owners. We find no evidence in support of the assertion by Mr. C. McArthur that ship owners are coming to the conclusion that the government must protect them by bounties. What our shipping is suffering from is too much government. But the whole debate was feeble, and a fine opportunity was lost of proclaiming to the nation that what our national shipping wants is not subsidies, but the abolition of the marine department of the board of trade and reciprocal arrangements with other nations with regard to coasting and colonial trade. To save our shipping we shall, sooner or later—and the sooner the better—have to jettison our merchant shipping laws."

SHIP BUILDING IN BRITISH COLUMBIA.

Vancouver, B. C., June 16.—The British Columbia Marine Railways Co., Ltd., which has works at Vancouver, Victoria and Esquimalt, has been favored with a very large business of late. The head office is at Victoria, under Mr. Wm. F. Bullen, who is managing director of the company. Esquimalt and Victoria are handled by the same staff. Operations at Vancouver are under the direction of Mr. George G. Bushby. At Esquimalt the company carries on most of its repair work in the large government graving dock. They are building there for the Canadian Pacific Navigation Co. a wooden vessel, for which they received a contract some time ago and have lately installed a large jig saw and complete equipment of pneumatic tools for wood and iron work, together with shears, rolls, angle iron cutters, punches, benders, etc., as well as a new lathe, radials, and an electric-driven, flexible-shaft, portable drill for repair work. A shop in Vancouver is being built on the same lines.

There seems to be a good deal of activity on this coast in shipping, numerous small vessels having been built on this side of the line, and many more in Ballard, Port Blakely, Seattle, etc. I went over to Seattle the other day and had a good look over Moran Bros.' works. They are going in for things rather heavily. They are building a covered building slip for the new battleship, and have all their tools well distributed, in order to facilitate work. In spite of numerous statements to the contrary, I think they will make some money out of their battleship.

There is a movement on foot here to build four-masted lumber carriers, but nothing has come of it as yet. The British Columbia company intends to lay one down upon completion of the Canadian Pacific Navigation Co.'s vessel, if no other contract offers.

DULUTH NEWS NOTES.

Duluth, Minn., June 18.—The Pittsburg Steamship Co. has announced, as was to be expected, that its whaleback steamer Thos. Wilson will be abandoned. The ship was sunk about a mile off Duluth harbor entrance on June 7 in collision with the Hadley. The Wilson's stack will be blown off, and the bodies of the nine men drowned will be rescued if possible.

Two of the old launching slips at the yard of the Superior Ship Building Co. are being filled, preparatory to the use of the ground for new shops. New punch shed, blacksmith shop, furnaces and shaping mills will be erected. The Barnett & Record Co. has contracted for the buildings, which will be of brick and steel.

Capt. Alex. McDougall is now president of the Highland Canal & Power Co. of Duluth, which proposes to generate and sell power on a magnificent scale. He has taken great interest in the project since its inception, and has put in much time and money. Associated with him as directors are Messrs. A. B. Wolvin of the Pittsburg Steamship Co., C. A. Duncan of the Duncan & Brewer Lumber Co., A. M. Marshall of the Marshall-Wells Hardware Co., and others representing the original promoters of the enterprise. An announcement as to the successful financing of the project is expected shortly.

Work is well advanced on the schooner yacht Hoosier for Col. W. R. Nelson of Kansas City, Mo., at the ship yard of John Bishop, Gloucester, Mass. The vessel is a cabin yacht, 125 ft. over all.

The San Francisco & Piedmont Railway, San Francisco, Cal., is to build two new ferry boats. They are to be double-end propellers, 200 ft. long and designed exclusively for passengers.

Even if orders are placed during the present month, lake ship builders will have difficulty getting material, especially shapes, for the delivery of new vessels in May of next year.

IRON AND STEEL INDUSTRY OF CANADA.

Consul General John L. Bittinger, writing to the state department from Montreal, of the iron and steel industry of Canada, says:

"A country that has vast deposits of iron ore has a solid foundation for commercial ascendancy. Few countries have more iron ore than the Dominion of Canada. It has also coal, and the immense value of these deposits has only been fully appreciated within the last few years. Americans were really the first to realize the immense resources here. They have entered and joined capital with Canadians of wealth and organized the iron and steel industry. The works are under the direction of Americans experienced in this line, and in two years the progress has been astoundingly rapid. Industrial Canada, a publication issued monthly by the Canadian Manufacturers' Association, gives much information concerning the iron and steel industry in Canada. It says:

"'If one takes a map and draws a line from British Columbia, on the west, to St. Johns, Newfoundland, on the east, the line will run through four well-developed beds of ore of large quantity and of excellent quality, all capable of being mined as cheaply as dirt. They are related to the coal as follows:

"'(1) For British Columbia, coal beds exist in the United States not far from Seattle, and in the Crow's Nest, on the Canadian side.

"'(2) On the northern shores of Lake Superior are large and pure beds, such as the Helen mine. They are being utilized by the Canadian Iron Furnace Co., at Midland, at the head of which is Mr. Clergue, an American. The Cramp Ontario Steel Co., another American company, will also utilize them in coke furnaces at Collingwood, which will have a daily capacity of 250 tons each. Both these plants can obtain their coal at a freight cost of $1.97 or $1.28 lower than the Pittsburg standard.

"'(3) In the Ontario district exist ores of great promise, within reasonable distance of United States coal fields. The government admits coke free of duty, which is favorable to the manufacturer.'

"Iron ore has been found on the Belcher's islands, the Sleepers, the Baker's Dozen, and the King George islands, in Hudson Bay, off the coast of Ungava. Some coal has also been found. There are eighteen rolling mills and steel works completed in Canada. Of these, one makes steel in a special Bessemer converter, one makes Tropenas steel, and four make open-hearth steel, while two standard Bessemer steel plants and one open-hearth steel plant are being built. The annual capacity of all plants is: Standard, Bessemer, Tropenas, and special Bessemer ingots and castings, 301,400 gross tons; open-hearth ingots and castings, 537,000 gross tons; total ingots and castings, 838,400 tons; rolled products, 981,900 tons.

"The crowning opportunity is in Nova Scotia, where two strong companies—the Dominion Iron and Steel Co. and the Nova Scotia Steel & Coal Co.—have been established with United States capital. The ore is drawn not only from Nova Scotia, in close proximity to the coal, but also from the famous mines on Belle island. The manufacturing is done at Sydney, and it is claimed the cost of pig iron there is lower than anywhere else in the world. Compared with the Pittsburg cost, it represents a saving of $2.455 per ton. There is a further saving of $2 a ton freight for export, Sydney being an ocean port. Pig iron can be made here for $6 a ton, steel blooms for less than $10 a ton, and steel rails at about $12. Steel rails and heavy sections of structural steel form a large part of the iron consumed in Canada. Up to a recent date every ton of this material was imported from foreign sources; now the country is beginning to export. The new mills at Sault Ste. Marie are producing both steel rails and structural steel. At Sydney a steel-rail mill is in process of construction and steel billets and blooms are already being made. At New Glasgow, Hamilton, and Collingwood a similar expansion in other lines of steel is taking place. In all of these places American capital is dominant. The following table shows the production of pig iron in Canada since 1894:

Year.	Tons. Quantity.	Year.	Tons. Quantity.
1901	244,976	1897	53,796
1900	86,090	1896	60,030
1899	94,077	1895	37,829
1898	68,756	1894	44,791

"Although the production for 1901 is about three times as large as that for the year previous, the building of new plants insures a much greater increase this year. Canada does not yet produce nearly enough for home wants, which are estimated at 800,000 tons a year. The table of exports of pig iron is as follows:

Year.	Quantity. Tons.	Value.
1892	3	$ 95
1893	12	330
1895	259	6,202
1896	1,940	45,363
1897	2,627	65,555
1898	2,403	61,029
1899	2,188	50,767
1901	5,623	117,456

"In the first eight months of the present fiscal year, Canada has exported 68,669 tons of pig iron, valued at $661,531—that is to say, the exports for the first eight months show an increase of 463 per cent over last year. In 1897 the value of Canada's total exports of 'iron and steel and manufactures of' was $1,397,195; in 1901, $3,717,527. Nevertheless, the total value of the import in this line in 1901 amounted to $27,107,419. The Dominion government grants bounties for the manufacture of iron and steel in Canada. They are as noted below:

Period—	On pig iron — From native ore. per ton	On pig iron — From foreign ore. per ton	On steel per ton
To April 21, 1902	$3.00	$2.00	$3.00
April 21, 1902, to July 1, 1903	2.70	1.80	2.70
July 1, 1903 to July 1, 1904	2.25	1.50	2.25
July 1, 1904 to July 1, 1905	1.65	1.10	1.65
July 1, 1905, to July 1, 1906	1.05	.70	1.05
July 1, 1906, to July 1, 1907	.60	.40	.60

"The amount paid in bounty on pig iron in Canada during each fiscal year since 1884 has been as follows:

Year.	Amount.	Year.	Amount.
1884	$44,090	1893	93,896
1885	38,655	1894	125,044
1886	39,270	1895	63,384
1887	59,576	1896	104,105
1888	33,313	1897	66,509
1889	37,234	1898	165,654
1890	25,697	1899	187,954
1891	20,153	1900	238,307
1892	30,294	1901	351,259

"These bounties were apportioned among the following firms: Canadian Iron Furnace Co., Three Rivers, $16,614; Midland Iron Works, $59,169; Deseronto Iron Co., $27,468; Dominion Iron & Steel Co., Sydney, $55,287; Electric Reduction Co., $1,173; Hamilton Iron & Steel Co., $12,455; John McDougall & Co., $2,379; Nova Scotia Steel & Iron Co., $66,711. There was paid out $16,703 in bounties on iron puddled bars. The Hamilton Iron & Steel Co. received the whole amount. The bounties on steel ingots amounted to $100,057, or $35,697 in excess of those of the year previous. The Hamilton Iron & Steel Co. received $28,310 and the Nova Scotia Steel Co. $71,746. Canadian bridge companies are also protected on structural steel up to 35 lbs. per yard, by a duty of $7 per ton. On steel of 36 lbs. per yard and heavier, the duty is 10 per cent. For electric street car purposes steel rails are dutiable at 30 per cent, and the same rate is charged on all light rails up to 45 lbs. per yard; but all rails outside of these two descriptions, and weighing over 45 lbs. per yard, are admitted into the country free. Much higher protection is being demanded by the iron and steel interests, but the government is not inclined to raise the tariff."

A PROTEST AGAINST THE SHIPPING BILL.

The Pure Oil Co. of Pittsburgh, which the Standard Oil Co. claims is the only genuine oil trust in the world, has protested against the passage of the shipping bill. Several of the congressmen filed copies of the protest received by them, so that they will become a part of the archives of congress. The protest was drawn up by a committee consisting of ex-Senator J. W. Lee, ex-Representative Thomas W. Phillips and Clarence Walker. They aver that their company represents some 700 different producers engaged in producing, refining, marketing and exporting petroleum. They give seven reasons for their protest, which are in substance as follows:

"First—The ship building industry is properous and the subsidy looks like a government gift without justification or excuse.

"Second—That it will aid in the establishment of a partial if not complete monopoly on the high seas, with power to levy tribute upon every American industry relying wholly or in part upon foreign markets. This will be more easily accomplished as a senate amendment, not reported from any committee, specifically exempts the subsidized ships from the provisions of the Sherman anti-trust law.

'Third—The railroads that have received millions in money from the government and lands greater in extent of territory than New England, New York, Pennsylvania, Ohio, Indiana and Illinois, have combined to rob the government and make discriminating rates and have violated every law ever made for the purpose of restraining them. 'If these alarming conditions exist in spite of the attempted regulation by the Sherman anti-trust law and the interstate commerce act,' ask the protestants, 'what may be expected from an ocean commission especially exempted from all government control?'

"Fourth—It is an intolerable exercise of the legislative power in that it takes the property of one man and gives it to another.

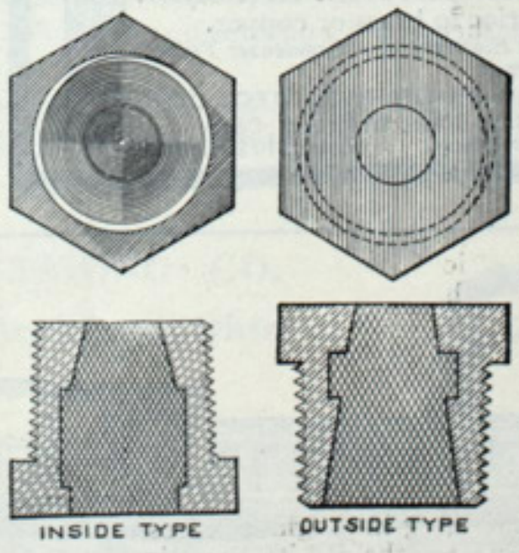
"Fifth—It is virtually an attempt to place an export duty on goods, in violation of the constitution.

"Sixth—The Pure Oil Co. protests against this bill, because it gives a bounty to tank steamers carrying petroleum, which has ranked third as an export, and thus discriminates in favor of some shippers who are prepared to take advantage of its provisions, and against all those who cannot transport in subsidized ships. We neither ask bounty nor do we desire that others shall receive it who do not need the advantage of this preference and can use it for the destruction of their competitors. It will not increase by a barrel the amount of oil exported, but may operate to limit its exportation."

In the seventh reason the objectors merely say they do not oppose liberal remuneration to ships to secure adequate and effective mail service.

FUSIBLE PLUGS.

In a circular dealing with fusible plugs, the Lunkenheimer Co., Cincinnati, O., says:



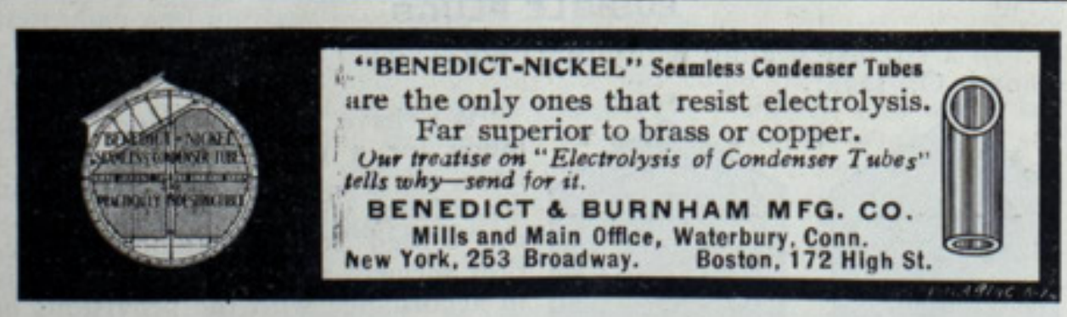
"We have been making fusible plugs for a great many years and have always made them strictly in accordance with the specifications of the United States steamboat inspection service, and the construction is in accordance with the provisions of Section 4436 of the United States revised statutes. These require that the plugs shall be made of bronze and have no other filling than pure Banca tin. We have certified to the above and filed affidavits with the United States inspectors, and our make of plug is accepted at all ports as complying with the specifications of the United States treasury department. Herewith are illustrated two forms of plugs—for outside and inside attachment. The outside type is intended to be used where the plug is inserted through the fire box of the boiler, while the inside pattern is the type usually required on marine work, as, in such cases, the plug must be inserted from the inside of the boiler. All sizes of both types of plugs are carried in stock."

COMMERCIAL ALASKA IN 1902.

"Commercial Alaska in 1902" is the title of a monograph prepared by the treasury bureau of statistics for publication in the forthcoming issue of the monthly summary. In this the commercial conditions, opportunities and prospects in Alaska are set forth, the number of industries at the present time, the routes of travel, the methods of reaching that once distant but now accessible territory, and a summarization of the commercial and financial results of ownership of that territory by the United States. This statement is presented at the present moment both by reason of the growing interest in Alaska and especially because of the fact that the bureau of statistics is to publish in future monthly statements of the commerce of Alaska with ports of the United States. Heretofore no detailed statistics of commerce with Alaska have been obtainable because of the fact that no provision of law existed for the collection of statistics of commerce between customs districts of the United States; and as Alaska was by law a customs district such statistics could not be gathered, under the law. When the Hawaiian islands and Porto Rico were also made customs districts of the United States, and the collection of statistics of our commerce with those islands was rendered impracticable, a measure providing for the collection of statistics of trade between the United States and all of its non-contiguous territories was framed by the bureau of statistics, approved by the secretary of the treasury, sent to congress, passed, and signed by the president; and, beginning with the new fiscal year, the record of trade between the United States and all of its noncontiguous territory will be available in form similar to that of commerce between the United States and foreign countries.

The fact that statistical statements of the commerce and conditions of Alaska have not been regularly made in the past renders the attempt to present a picture of present conditions in Alaska a difficult one. Necessarily the information is fragmentary. Aside from the statistics of population published by the census, and statements of the number of fur seals taken by the lessees of the Pribilof islands, the number of cans of salmon packed and the number of fish taken, as reported by the special agent of the treasury department, and the statements of gold production reported by the mint bureau, little information of a statistical nature is available. Even these reports are extremely meager, and in most cases the statements are simply those of quantity unaccompanied by estimates of value. The shipments of merchandise between the United States and Alaska have been considered as coastwise commerce, and no reports of the value of merchandise so transported have been made to the collectors; while in many cases the manifests are so indefinite in statements of quantity that it has been found difficult to obtain satisfactory estimates in detail of the movements of merchandise into and out of Alaska. The fluctuation in prices of the seal and other furs, and the salmon and other fish, which have been, until recent years, the chief industries of Alaska, coupled with the fact that in the official reports only quantities were stated, have in the past rendered detailed statements of values year by year difficult. The statements which are presented as to the industries and their result from a financial standpoint are the results of careful inquiries from collectors of customs both in Alaska and the United States by the various governors of Alaska and their subordinates and by the special agents of the government appointed to report upon the various industries.

In general terms it may be said that Alaska, for which the United States paid Russia $7,200,000 in 1867, has supplied furs, fish and gold amounting to about $150,000,000 in value, about equally divided between these three items; that the investments of capital from the United States in Alaska are probably $25,000,000 with a large additional sum invested in transportation to that territory; and that the annual shipments of merchandise to Alaska now aggregate more than $12,000,000, and have aggregated since the purchase nearly or quite $100,000,000. Meantime the population has grown from an estimated 30,000 at the date of purchase to 32,052 in 1890, 63,592 in 1900, and an estimated 75,000 at the present time. The number of fur seals taken on the Pribilof islands from 1870 to 1901 is 2,187,317, and the value of the seal and other furs taken since the purchase of Alaska by the United States is estimated at about $50,000,000. The fur seal industry, which has declined in the last few years, was succeeded by the fishing industry, Alaska now supplying about one-half of the salmon of the country. The value of the salmon pack in Alaska last year is estimated at about $7,000,000, and the total value of the fish taken in Alaska since the purchase, about $50,000,000; while the value of gold and silver mined since the purchase is also about $50,000,000.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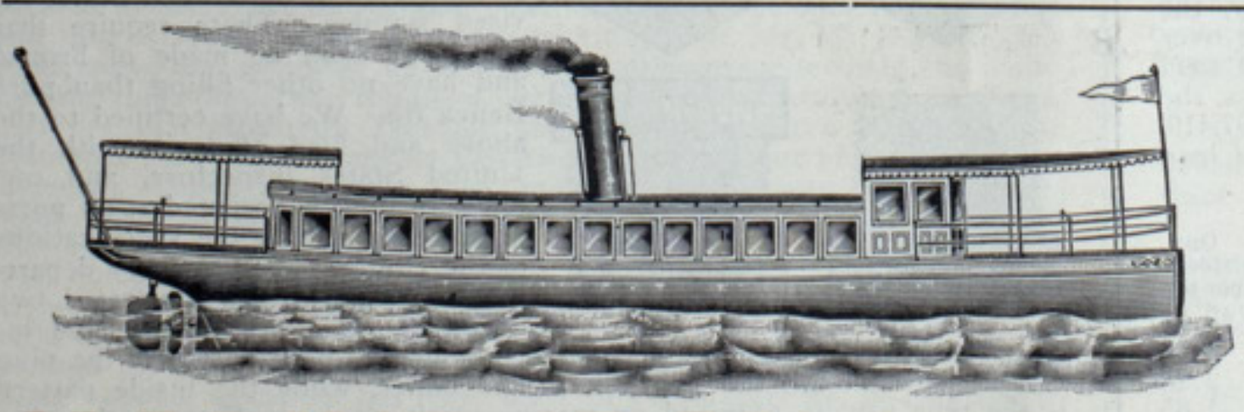

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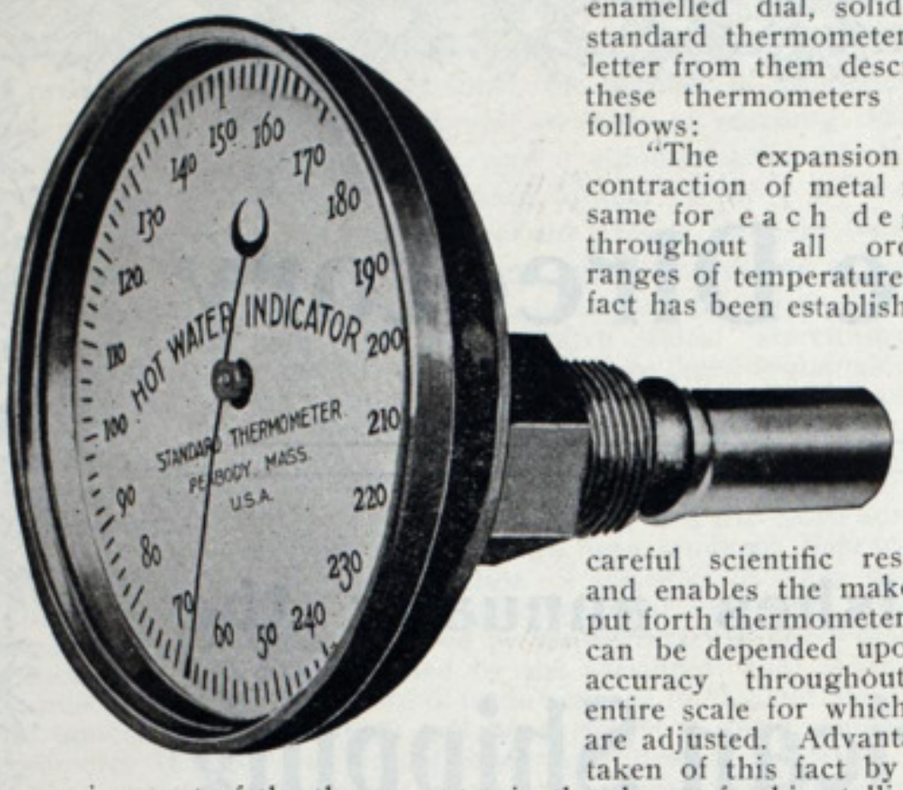
"PRESERVO" WILL NOT CRACK, SCALE, FREEZE OR STICK—SEE PAGE 8.

ENAMELLED DIAL STANDARD THERMOMETERS.

The Helios-Upton Co., Peabody, Mass., make a specialty of thermometers for mechanical uses. They direct special attention to their enamelled dial, solid case, standard thermometers. A letter from them describing these thermometers is as follows:



"The expansion and contraction of metal is the same for each degree throughout all ordinary ranges of temperature. This fact has been established by careful scientific research, and enables the makers to put forth thermometers that can be depended upon for accuracy throughout the entire scale for which they are adjusted. Advantage is taken of this fact by making the moving part of the thermometer in the shape of a bimetallic strip of metal which we call a lamina, which is coiled upon a mandrel in a cylindrical form. The thermometers are constructed with these lamina or working parts of the instrument at the end of the instrument extension farthest away from the case, so that the lamina may be put through the shell of a boiler, the side of an oven or the wall of a kiln, through a hole drilled for that purpose, to allow the extension to project into any liquid or into the hot or cold vapor contained therein, showing the temperature of the same on the dial outside. The instruments are held in place by substantial screws of regular pipe thread size, so that the threads may be cut through the boiler, etc., by regular taps. When the instrument is screwed in position it is a permanent part of the boiler itself, and a perfectly tight joint is made around the stem of the instrument.

The particular advantages of the standard dial thermometers over the mercury column instruments are their accuracy after long continued use, and the legibility of their dials. The ease with which these thermometers are read at a distance enables the person in charge to see at a glance just what temperature is being carried in the heaters or boilers at any time without the necessity of going across the room to look at the scale. This saves many steps and hours of work in time. These instruments can be easily repaired if damaged, and are therefore much cheaper to the consumer than the mercury column instrument, which, if they are damaged at all, are usually worthless and beyond repair.

The C. W. Trainer Mnfg. Co. of Boston has been having some difficulties with Keasbey & Mattison over patent claims regarding magnesia boiler covering. They recently received the following report from their lawyers, Messrs. Kenyon & Kenyon of 49 Wall street, New York: "We beg to inform you of the favorable decision of Judge Colt on our demurrer to the bill of complaint in Keasbey & Mattison vs. C. W. Trainer Mnfg. Co. Judge Colt decided that the bill of Keasbey & Mattison was multifarious, and required them to discontinue the action for unfair competition as set out in the bill."

James McKay & Co., chain makers of Pittsburgh, Pa., are adding a department of light forgings to their business. A building 100 by 40 ft. to house the plant is now in course of erection and it is expected that the plant will be in operation by Oct. 1. The expenditure will be approximately $20,000.

Sealed proposals will be received at the office of the Light-House Board, Washington, D. C., until 2 o'clock p. m., July 10, 1902, and then opened, for furnishing the materials and labor of all kinds necessary for the construction and delivery of the twin screw steel steam light-house tender Crocus for a fixed sum for said vessel delivered either at the Buoy Depot, Buffalo, N. Y., or at the Light-House Depot, Tompkinsville, N. Y., as will be determined upon by the Light-House Board. Proposals, plans and specifications can be had by applying to the Light-House Board, Washington, D. C., or at the office of the Light-House Inspector, Buffalo, N. Y. George C. Remey, Rear-Admiral, U. S. N., Chairman. June 26.

Position as Manager.

Position as manager, superintendent or designer with yacht or launch building concern, wanted by naval architect who has had over twenty years' experience in designing and building yachts and other vessels, steam and gas engines, etc. Fully up to date in modern office systems and labor-saving methods. Has now a position with one of the largest ship yards in America, but would prefer to work for a smaller company. Address, "Industrious," the Marine Review Pub. Co., Wade building, Cleveland. June 19.

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Number of Nautical Miles made each year by Steamships of the Messageries Maritimes Co., Provided with Belleville Generators—Since their Adoption in the Service.

Year.	Australien	Polynésien	Armand Béhic	Ville de la Ciotat	Ernest Simons	Chili	Cordillère	Laos	Indus	Tonkin	Annam	Atlantique
1890.....	67,728	2,460										
1891.....	68,247	68,331	204									
1892.....	68,247	68,403	69,822	23,259								
1893.....	68,379	68,343	68,286	68,247								
1894.....	68,439	68,367	68.574	68,439	37,701							
1895....	68,673	68,766	68,739	68,808	40,887	28,713						
1896.....	69,534	92,718	69,696	69,549	62,205	63,153	40,716					
1897.....	68,250	69,606	92,736	69,555	62,235	76,110	63,357	43,146				
1898.....	70,938	69,534	69,552	69,597	62,526	63,240	63,240	62,553	63,954	22,707		
1899.....	69,534	69,615	67,431	90,405	60,246	62,778	62,868	52,344	54,855	44,007	22,884	
1900...	69,534	67,494	69,744	69,564	61,719	62,382	62,502	51,471	53,373	62,016	63,066	52,140
1901.....	44,220	69,627	69,594	66,948	51,057	62,460	62,490	61,743	62,688	43,866	62,466	63,126
Total.....	801,723	783,264	714,378	664,371	438,576	418,836	355,173	271,257	234,870	172,596	148,416	115,266

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